

REVISION OF THE NEARCTIC ICHNEUMON-FLIES BELONGING TO THE GENUS MACROCENTRUS

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During the past several years species of the braconid genus *Macrocentrus* Curtis have been rather abundantly reared from the larvae of certain injurious Lepidoptera, especially from the introduced oriental fruit moth (*Laspeyresia molesta* Busck) and the European corn borer (*Pyrausta nubilalis* Hübner). The numerous requests for identification of specimens of *Macrocentrus* that have come to the taxonomic unit of the Bureau of Entomology, combined with the difficulties in making such identifications owing to the unworked condition of the group, resulted in a demand for a revision of the species occurring in the United States and Canada. Accordingly, I was requested to undertake a study of *Macrocentrus*, the results of which, presented in this paper, represent a joint contribution from the division of forest insects (gipsy moth and brown-tail moth investigations) and the taxonomic unit of the Bureau of Entomology.

For the opportunity of examining material in their custody I am indebted to Dr. E. T. Cresson, jr., of the Philadelphia Academy of Natural Sciences; to C. W. Johnson, of the Boston Society of Natural History; and Dr. W. E. Britton, of the Connecticut Agricultural Experiment Station. I wish also to acknowledge my appreciation of helpful suggestions given by A. B. Gahan and R. A. Cushman, of the taxonomic staff of the Bureau of Entomology. Finally, I am indebted to C. W. Collins, in charge of the gipsy moth and brown-tail moth investigations of the division of forest insects, and to Dr. Harold Morrison, in charge of the taxonomic unit, whose cooperation has made the study possible.

Although, as noted above, certain material in other institutions has been examined, the present revision is based primarily on the collections of *Macrocentrus* in the United States National Museum, which consist in large part of specimens reared in the Bureau of Entomology in the course of studies relating to the life history and

control of various injurious species of Lepidoptera. The types of most of the previously described species of *Macrocentrus* have been examined. I have not, however, seen the type of *nigridorsis* Viereck, which is in the Canadian National Collection at Ottawa; that of *iridescens* French, the location of which is unknown to me; or those of the four species described by Provancher, namely, *uniformis*, *pectoralis*, *mellipes*, and *longicornis*, which are in the Museum of Public Instruction at Quebec, although notes made several years ago by S. A. Rohwer on the types of the Provancher species have aided materially in the identification of some of these. It has been found impossible to identify *nigridorsis*, *iridescens*, and *pectoralis* with certainty, but the apparent position and relationships of each of these will be discussed.

Owing to the little taxonomic attention that has been given this genus in recent years, it has become necessary to describe 20 new species in connection with this revision. The types of 19 of these are in the United States National Museum, while that of one species is in the collection of the Boston Society of Natural History.

Family BRACONIDAE

Subfamily MACROCENTRINAE

Genus MACROCENTRUS Curtis

Macrocentrus CURTIS, Ent. Mag., vol. 1, p. 187, 1833. (Genotype, *Macrocentrus bicolor* Curtis=*Macrocentrus thoracicus* (Nees).)

Amicroplus FOERSTER, Verh. naturh. Ver. preuss. Rheinlands, vol. 19, p. 256, 1862. (Genotype, *Rogas collaris* (Spinola) Nees.)

Fhogra CAMERON, Trans. New Zealand Inst., vol. 33, p. 104, 1901. (Genotype, *Fhogra rubromaculata* Cameron.) (New synonymy.)

Dolichozele VIREECK, Proc. U. S. Nat. Mus., vol. 40, p. 182, 1911. (Genotype, *Dolichozele koebelei* Viereck.) (New synonymy.)

Metapleurodon ENDERLEIN, Arch. Naturg., vol. 84A, pt. 11, p. 213, 1920. (Genotype, *Metapleurodon ceylonicus* Enderlein.) (New synonymy.)

Paniscozele ENDERLEIN, Arch. Naturg., vol. 84A, pt. 11, p. 214, 1920. (Genotype, *Paniscozele sumatrana* Enderlein.) (New synonymy.)

Most workers in the Braconidae have recognized the close relationship between *Macrocentrus* and *Zele*, and since the publication of Foerster's classification¹ in 1862 the two genera have constituted the basis of a distinct major division of the Braconidae. Ashmead² divided his subfamily Macrocentrinae, which corresponds to the Macrocentroidae of Foerster and the Macrocentrides of Marshall,³ into two tribes, the Macrocentrini and the Zelini, with *Macrocentrus* and *Zele*, respectively, the typical genera. And although they

¹ Verh. naturh. Ver. preuss. Rheinlands, vol. 19, p. 256, 1862.

² Proc. U. S. Nat. Mus., vol. 23, p. 118, 1900.

³ Trans. Ent. Soc. London, 1885, p. 10.

are obviously closely related, the two groups exhibit well-defined differences, which under some systems of classification may be considered of tribal value. *Macrocentrus* has the occiput entirely immargined, eyes not at all emarginate, first segment of flagellum nearly always much longer than the scape, pronotum medially above flat and always without anteriorly converging keels, the insertion of the abdomen entirely above the upper level of the insertion of the posterior coxae, the medius always more or less curved backward near the middle, trochanters usually armed with short teeth at apex on the outer side, longer calcarium of posterior tibia rarely more than half as long as basitarsus, and the ovipositor usually long. *Zele*, on the other hand, has the occiput distinctly margined, eyes slightly emarginate, first flagellar segment usually no longer than scape, the dorsum of pronotum always with two prominent keels medially that converge anteriorly and set off a small triangular area just in front of the prescutum, the insertion of the abdomen not completely above the upper level of the insertion of hind coxae, medius straight, not at all curved backward near the middle, trochanters always without the apical teeth usually found in *Macrocentrus*, longer calcarium of posterior tibia always more than half as long as basitarsus, and the ovipositor always very short.

In addition to *Macrocentrus* Ashmead included in his tribe Macrocentrini the following genera: *Dicranoneura* Kriechbaumer, which was proposed for an African species and apparently does not occur in North America; *Microtypus* Ratzeburg, which is more closely related to the Blacinae than to the Macrocentrinae and should be definitely excluded from the latter group;⁴ *Amicoplidea* Ashmead, based upon *Phylax palliventris* Provancher, which appears from the original description, and from notes made by S. A. Rohwer on an examination of the type in 1915, to be an exothecine rather than a macrocentrine; and *Amicroplus* Foerster, which, as indicated by Lyle,⁵ must be synonymized with *Macrocentrus*.

In 1920 Enderlein erected *Paniscozele* for a group of seven new species from the Oriental, Ethiopian, and Neotropical regions. Viereck in 1911, however, had proposed *Dolichozele* for a South American species, which is clearly congeneric. Several years ago I had the opportunity of examining the genotype of *Paniscozele*, which is in the Pomeranian Museum of Natural History at Stettin, and a comparison of my notes on *P. sumatrana* Enderlein with the genotype of *Dolichozele*, which is in the United States National Museum, has shown conclusively that *Paniscozele* must be sup-

⁴ Szepliget, Ann. Mus. Nat. Hungarici, vol. 6, p. 426, 1908, has proposed the subfamily Microtypinae for this genus.

⁵ Entomologist, vol. 47, p. 257, 1914.

pressed as a synonym of *Dolichozele*. And the latter name, in my opinion, must in turn fall as a synonym of *Macrocentrus*. Apart from the very short ovipositor, the long calcaria of the posterior tibiae, and the long acute metapleural tooth, *Dolichozele* does not differ from normal *Macrocentrus*, and these differences are apparently only comparative. *Paniscozele atreitarsis*, one of Enderlein's originally included species, was described as having an ovipositor nearly as long as the body; while the metapleural tooth, though usually less prominent and acute, occurs in nearly all species of *Macrocentrus*, and the long tibial calcaria are found in some. Accordingly, since it has seemed impossible to distinguish clearly between *Dolichozele* and *Macrocentrus*, I have placed the former, and its synonym *Paniscozele*, in synonymy under *Macrocentrus*.

I have also seen the type of *Fhogra rubromaculata* Cameron, which is in the British Museum, and that of *Metapleurodon ceylonicus* Enderlein, which is in the Pomeranian Museum of Natural History, the genotypic species, respectively, of *Fhogra* Cameron and *Metapleurodon* Enderlein. In my opinion both belong in *Macrocentrus*.

Apparently all species of *Macrocentrus* are internal parasites of lepidopterous larvae, and at least in most cases the host larvae live more or less concealed, principally as leaf rollers or as borers. Most of the species seem to be solitary parasites, but some are gregarious, and in the case of the latter type it has been frequently observed that all adults obtained from a single group of cocoons are usually of one sex. This naturally has suggested the probable occurrence of polyembryony, and recently Parker⁶ has shown that this method of reproduction does occur in *Macrocentrus gifuensis* Ashmead, a gregarious parasite of the European corn borer (*Pyrausta nubilalis* Hübner). No doubt it is common to many species of the genus.

Species of *Macrocentrus* appear to be rather less specific in host selection than those of many other groups of Braconidae, and the same host species may be attacked by several different forms. Four species of *Macrocentrus*, for example, are known to parasitize the larvae of *Laspeyresia molesta* Busck, the introduced oriental fruit moth; while 9 different host species have been recorded for *M. ancyli-vorus* and 12 for *M. delicatus*. A list of the hosts of *Macrocentrus* recorded in this paper is given on pages 53-54.

Owing to the extent of variation occurring within species, it has seemed desirable to make the key rather full and to give detailed descriptions of the species.

⁶ U. S. Dept. Agr. Tech. Bull. 230, 63 pp., illus., 1931.

KEY TO THE NEARCTIC SPECIES OF MACROCENTRUS¹

- 1. Maxillary palpi short, not distinctly longer than height of head; labial palpi very short, shorter than the face, even the apical segment but little longer than thick; antennae 24 to 40 segmented; head always black; small species, normally measuring 3 to 4.5 mm. in length..... 2
- Maxillary palpi usually much longer than height of head; very rarely not distinctly so, but then head is not black; labial palpi rarely shorter than face, the apical segment usually three or more times as long as thick; antennae normally 40 to 60 segmented..... 5
- 2. Second intercubitus lacking; nervellus inclivous, much longer than lower abscissa of basella, the latter hardly one-fourth as long as mediella; antennae 24 to 30 segmented; ovipositor sheaths a little longer than abdomen, but much shorter than body; thorax and abdomen mostly piceous or blackish, with prothorax and mesothorax paler..... 1. *incompletus*, new species
- Second intercubitus distinct though often hyaline; nervellus at least no longer than lower abscissa of basella, the latter less than one-third mediella; antennae usually 30 to 40 segmented; ovipositor sheaths at least as long as the body..... 3
- 3. Legs short and rather stout; anterior basitarsus not distinctly half as long as anterior tibia; apical segment of anterior tarsus as long as the second; longer calcarium of posterior tibia half as long as basitarsus; antennae distinctly shorter than the body, second flagellar segment only twice as long as thick; thorax and abdomen black..... 2. *crassipes*, new species
- Legs very slender; anterior basitarsus more than half as long as anterior tibia; apical segment of anterior tarsus much shorter than the second; longer calcarium of posterior tibia much less than half as long as basitarsus; antennae longer than the body, second flagellar segment more than three times as long as thick; thorax and abdomen usually more or less yellowish..... 4
- 4. Eyes small; cheeks broad and strongly convex in both sexes; female antennae normally 32 to 35 segmented, flagellum mostly brownish piceous except three or four basal segments, which are yellowish; male thorax more or less blackish or piceous, mesonotum and sometimes entire thorax blackish.
 - 3. *crambivorus* Viereck
 - Eyes not especially small; cheeks gradually receding; female antennae normally 37 to 39 segmented, flagellum yellowish with apical half somewhat fuscous; thorax in both sexes yellow, with pronotum and propodeum dusky or blackish.
 - 4. *crambi* (Ashmead)

¹ In the key, as well as in the descriptions and discussions that follow, much use has been made of venational differences. The terminology employed is that proposed by Rohwer and Gahan, *Horismology of the hymenopterous wing*, Proc. Ent. Soc. Washington, vol. 18, pp. 20-76, 1916.

5. Submedian cell always closely hairy, never glabrous at apex; apical teeth of trochanters, especially of anterior legs, very weak, indistinct; mediella not, or hardly, more than twice as long as lower abscissa of basella, the latter longer than nervellus, usually much longer; scutellum usually not distinctly half the median length of propodeum; stigma never uniformly pale yellow; small, slender species that are apparently all gregarious parasites..... 6
- Submedian cell weakly hairy apically, usually with a distinct hairless area at apex, rarely uniformly hairy, but then mediella about three times as long as lower abscissa of basella with the latter not longer than nervellus, and the apical teeth of trochanters distinct, or the stigma uniformly pale yellow; scutellum usually more than half the median length of propodeum; apparently all solitary parasites..... 13
6. Head entirely black; face broader, usually much broader, than long to base of clypeus; ocell-ocular line twice as long as diameter of a lateral ocellus; thorax varying from entirely black to entirely yellow, but usually at least pronotum more or less dusky or blackish..... 7
- Head varying from yellow to mostly black, the face never entirely black, at most reddish brown, blackish above and medially, and then face not distinctly broader than long to base of clypeus and ocell-ocular line distinctly less than twice the diameter of a lateral ocellus; at least pronotum and venter of thorax pale, even in the darkest specimens..... 12
7. Metapleurum completely rugulose and subopaque; mesopleurum below and anteriorly as well as prepectus usually punctat-rugulose; face nearly twice as broad as long to clypeus; malar space about as long as clypeus; three basal abdominal tergites testaceous, thorax usually black or blackish, with metanotum and propodeum often ferruginous... 5. *terminalis* (Ashmead)
- Metapleurum smooth at least basally; basal abdominal tergites usually black or blackish; otherwise not combining all the above characters..... 8
8. First, second, and more or less of third abdominal tergites closely longitudinally aciculate; nervulus distinctly a little postfurcal; stigma usually without a distinct pale spot at base; ovipositor sheaths at least as long as the body..... 9
- Only the first and second abdominal tergites sculptured and the second usually smooth apically; nervulus interstitial; stigma brown with a conspicuous yellow spot at base; ovipositor sheaths not longer than abdomen..... 6. *longicornis* Provaucher
9. Radial cell unusually short, measured on wing margin only a little longer than stigma and about one and one-half times as long as its greatest width; nervellus nearly as long as lower abscissa of basella; abdomen entirely black or blackish above and below; posterior tibiae black except at base; all tarsi blackish..... 7. *peroneae*, new species
- Radial cell normal, about twice as long, measured on wing margin, as its greatest width; nervellus much shorter than lower abscissa of basella; three basal abdominal sternites usually pale; usually more or less of third tergite, sometimes more or less of the three basal tergites, reddish yellow..... 10

10. Malar space about as long as clypeus; level of lower eye margins not distinctly below base of clypeus; dorsum of abdomen entirely black except sometimes on apex of third tergite; thorax black..... 8. *harrisi* De Gant
- Malar space much shorter than clypeus; level of lower eye margins distinctly below base of clypeus; abdomen with at least most of the third tergite, often with more or less of first and second tergites also, testaceous; thorax varying from entirely black to entirely testaceous..... 11
11. Thorax entirely black or piceous; mandibles crossing at tips..... 9. *pyraustae* Viereck
- Thorax varying from entirely testaceous to mostly blackish; at least the venter of thorax, and nearly always the prescutum, yellowish; mandibles barely meeting at tips, the teeth unusually short..... 10. *gifuensis* Ashmead
12. Stigma brown with a large pale spot at base, the apex also narrowly, and usually the anterior margin, pale; nervulus distinctly a little postfurcal; mandibles strongly crossing at tips, the teeth well developed..... 11. *amicroploides* Viereck
- Stigma entirely brown; nervulus interstitial; mandibles very short, hardly meeting at tips, the teeth very short.
12. *crocidophorae*, new species
13. First abdominal tergite more or less distinctly impressed or excavated medially at base in front of spiracles; spiracles of first tergite usually farther from each other than from base of tergite; stigma variable; longer calcarium of posterior tibia never more than half as long as metatarsus..... 14
- First abdominal tergite not impressed or excavated medially at base in front of spiracles; spiracles near end of basal third and farther from base of tergite than from each other; occasionally in *uniformis* the first tergite faintly, very shallowly, impressed at base, but then longer calcarium of posterior tibia much more than half as long as basitarsus; stigma long, lanceolate, always entirely yellow, with radius arising from beyond its middle..... 33
14. Extreme length of first discoidal cell not, or scarcely, greater than that of first cubital; second abscissa of cubitus more, usually much more, than half as long as recurrent vein; basella usually interstitial with transverse abscissa of subcostella; radius arising from well beyond middle of stigma..... 26
- Extreme length of first discoidal cell much greater than that of first cubital; second abscissa of cubitus not more, usually much less, than half as long as recurrent vein; basella very rarely interstitial with transverse abscissa of subcostella..... 15
15. Lower abscissa of basella half, or more than half, as long as mediella and distinctly longer than nervellus; face conspicuously impressed medially above; longest segment of maxillary palpus much longer than second segment of antennal flagellum; stigma unicolorous, yellow or brown, radius arising from much beyond its middle; radial cell ending considerably before wing apex..... 16
- Lower abscissa of basella much less than half as long as mediella and not distinctly longer than nervellus; otherwise not combining the above characters..... 17

16. Head and abdomen black; thorax black above; stigma brown; antennae, including scape, blackish----- 13. *atratus*, new species
 Head, thorax, and abdomen uniformly yellow; stigma entirely yellow----- 14. *impressus*, new species
17. Metapleurum completely punctato-rugulose; propodeum strongly rugoso-reticulate; lower part of mesopleurum depressed and confluent punctate; prepectus sculptured; first tergite about three times as long as wide at apex, ruguloso-striate, the spiracles situated beyond basal fourth of tergite; posterior femora longer than their coxae and trochanters combined.
 15. *reticulatus*, new species
 Metapleurum mostly smooth; propodeum finely, usually more or less transversely, sculptured; posterior femora not longer than their coxae and trochanters combined----- 18
18. Apex of radial cell much before wing apex; metacarpus extending length of second intercubitus beyond apex of radial cell; stigma brown, with a conspicuous pale spot at base; nervulus postfurcal by not more than half its length; third abdominal tergite mostly aciculate, the lateral depressed margins of second tergite not wider at base than at middle of tergite----- 19
 Radial cell more nearly attaining apex of wing; metacarpus not extending conspicuously beyond apex of radial cell; color of stigma, origin of nervulus, and sculpture of third abdominal tergite not combined as above----- 20
19. Antennae normally 45 to 50 segmented; nervellus distinctly a little longer than lower abscissa of basella, the latter but little longer than upper abscissa of basella; spiracles of first tergite usually before end of basal fourth of tergite; length usually 4.5 to 5 mm----- 16. *canarsiae*, new species
 Antennae normally 52 to 54 segmented; nervellus not distinctly longer than lower abscissa of basella, the latter nearly twice the upper abscissa; spiracles of first tergite usually distinctly a little beyond basal fourth of tergite; length usually 6.5 to 7 mm----- 17. *insularis*, new species
20. Clypeus very weakly convex and unusually broad, broader than length of second segment of antennal flagellum; distance between clypeal foveae fully as long as face; mandibles large, stout; eyes not prominent, extending but little beyond outer margins of temples; face nearly twice as broad as long to base of clypeus----- 18. *clypeatus*, new species
 Clypeus normal, convex, much narrower than length of second flagellar segment; interfoveal line shorter; eyes prominent; face much less than twice as broad as long----- 21
21. Maxillary palpus with longest segment not distinctly longer than second segment of antennal flagellum; stigma brown with a conspicuous pale spot at base, or yellow with a distinct cloud in apical half; nervulus never postfurcal by as much as its length; abdomen varying from entirely testaceous to more or less blackish at base and apex, but second and third tergites always entirely pale; second tergite not distinctly longer than broad at apex, usually smooth apically; male scape not swollen----- 22

Maxillary palpus with longest segment usually longer than second segment of antennal flagellum; stigma most frequently uniformly brown or yellow; nervulus usually postfurcal by about its own length; usually second and third tergites more or less blackish as well as the first and sometimes the following in part; second tergite most frequently longer than broad and usually completely aciculate; male scape swollen..... 24

22. First abdominal tergite unusually stout, usually not more than one and one-half times as long as broad at apex; distance between spiracles of first tergite at least half the basal width of propodeum; antennae normally 50 to 54 segmented; clypeus about as broad as length of scape and broadly strongly emarginate at apex..... 19. *robustus*, new species

First tergite not especially stout, usually twice as long as broad at apex; distance between spiracles of first tergite much less than half the basal width of propodeum; antennae normally 42 to 48 segmented; clypeus not so broad as length of scape..... 23

23. Mesonotal lobes, and mesosternum posteriorly, black; second abdominal tergite usually completely finely aciculate, the third more weakly so on basal half; ocell-ocular line twice as long as diameter of a lateral ocellus; mesopleurum closely punctate and subopaque below..... 20. *nigripectus*, new species

Mesonotal lobes and mesosternum never black; second abdominal tergite usually smooth apically, the third rarely with distinct aciculations; ocell-ocular line not twice the diameter of a median ocellus; mesopleurum smooth and shining.

21. *ancylivorus* Rohwer

24. Face, viewed from in front, only very little, often indistinctly, broader than long; antennae usually 45 to 50 segmented; stigma usually uniformly brown, occasionally entirely pale yellow; mesoscutum posteriorly sharply emarginate, the scutellar furrow scarcely transverse; dorsum of thorax and abdomen most frequently largely blackish or piceous, though rarely almost entirely yellow; length normally 4 to 5 mm.

22. *instabilis*, new species

Face much broader than long; antennae usually more than 50-segmented; mesoscutum not so sharply emarginate at apex, the scutellar furrow strongly transverse; length usually 6 to 7.5 mm..... 25

25. Second abdominal tergite completely aciculate and usually distinctly longer than broad at apex, the depressed lateral margins not much broadened at base of tergite; third tergite aciculate on basal half; prescutum prominently elevated, descending almost vertically in front; head thin, cheeks not wider than temples, as viewed from side; rather uniformly yellowish ferruginous, mesonotal lobes not blackish.

23. *utilis*, new species

Second abdominal tergite usually mostly smooth apically and usually hardly as long as broad at apex, the depressed lateral margins much broadened at base of tergite; third tergite usually not, or only indistinctly, aciculate; prescutum not strongly convex, descending more gradually in front; cheeks

- a little wider than temples; mesonotal lobes nearly always more or less black or dusky medially; metanotum, propodeum, and basal abdominal tergites usually more or less blackish.
24. *laspeyresiae*, new species
26. Head, thorax and abdomen black, the lower part of pleura and the mesosternum sometimes ferruginous..... 27
 Ferruginous or testaceous, often varied with black; abdomen very rarely entirely black, and then head and thorax ferruginous..... 28
27. Legs, including posterior tibiae, honey-yellow; third abdominal tergite completely smooth; nervulus postfurcal by more than half its length..... 25. *mellipes* Provancher
 Posterior tibiae black, pale only at base; third abdominal tergite usually distinctly finely aciculate on basal half; nervulus usually postfurcal by less than half its length..... 26. *aegeriae* Rohwer
28. First and second abdominal tergites incompletely aciculate, the second only weakly so at base; third tergite entirely smooth; second suture indistinct, the second and third tergites not, or indistinctly, separated; radiella not sinuate, the radiellan cell not broadening from middle to apex; wings clear hyaline, with no suggestion of duskiness; posterior coxae completely polished, with no transverse aciculation or lineolation..... 29
 First, second, and most of third, tergites longitudinally aciculate; second and third tergites separated by a fine but distinct suture; radiella more or less sinuate, the radiellan cell broadening a little from middle to apex; wings often a little dusky; posterior coxae usually delicately transversely aciculate or lineolate toward apex..... 31
29. Eyes rather small, not prominent, not or scarcely extending beyond outer margins of temples; clypeus short and broad, nearly flat; face nearly twice as broad as long to base of clypeus; mesopleura and metapleura impunctate.
 Eyes large, prominent, extending much beyond outer margins of temples; clypeus strongly convex; face only a little broader than long; mesopleura and metapleura uniformly punctate..... 30
30. Abdomen entirely black, including sternites; legs infuscated; hind tibiae black..... 28. *seminiger*, new species
 Abdomen brownish ferruginous, black at apex; legs testaceous, including hind tibiae..... 29. *affinis*, new species
31. Abdomen short, not distinctly longer than head and thorax combined; eyes very small, not prominent; face about twice as broad as long to base of clypeus; interfoveal line of clypeus hardly as long as foveo-ocular line..... 30. *fuscipennis*, new species
 Abdomen more elongate, distinctly longer than head and thorax combined; eyes prominent, extending much beyond outer margins of temples; face much less than twice as broad as long; interfoveal line longer than foveo-ocular line..... 32

32. Antennae normally 44 to 50 segmented; longest segment of maxillary palpus usually shorter than second segment of antennal flagellum; nervulus usually interstitial; stigma usually brown, paler at base; palpi and tarsi usually more or less fuscous or blackish; head varying from entirely testaceous to entirely black, more or less of occiput and vertex usually blackish; thorax varying from entirely yellow to mostly black; apex of abdomen often black----- 31. *pallisteri* De Gant
- Antennae normally 50 to 55 segmented; longest segment of maxillary palpus at least as long as second flagellar segment of antenna, usually longer; nervulus usually a little postfurcal; stigma uniformly yellow or yellowish ferruginous; palpi and tarsi pale yellow; head, thorax, and abdomen entirely ferruginous or testaceous, without blackish markings. 32. *cerasivoranae* Viereck
33. First, second, and more or less of third abdominal tergites closely longitudinally aciculate or delicately ruguloso-aciculate; longer calcarium of posterior tibia never more than half as long as basitarsus, usually distinctly less; metapleural tooth rounded or truncate; second abscissa of cubitus most frequently less than half as long as recurrent vein; vertex either entirely yellow or with a blackish transverse band----- 34
- Three basal abdominal tergites mostly smooth; longer calcarium of posterior tibia distinctly more than half as long as basitarsus; metapleural tooth acute, very prominent; second abscissa of cubitus much more than half as long, sometimes fully as long, as recurrent vein; vertex always with a broad blackish transverse band extending to the eyes----- 35
34. First abdominal tergite not distinctly three times as long as broad at apex; second tergite only a little, or not, longer than broad; third not longer than broad; nervulus postfurcal by nearly, or quite, its own length; radiellian cell widening slightly at apex; head, including vertex, entirely pale---- 33. *delicatus* Cresson
- First abdominal tergite very slender, more than three times as long as broad at apex; second tergite about twice as long as broad; third much longer than broad; nervulus only slightly postfurcal; radiellian cell not widening at apex; vertex with a broad blackish transverse band extending to the eyes, or nearly----- 34. *nuperus* Cresson
35. Ovipositor sheaths as long as the body; eyes large, very prominent, not divergent below; temples and cheeks strongly receding; longest segment of maxillary palpus hardly as long as first segment of antennal flagellum; first abdominal tergite narrowing from spiracles to base; radiella only weakly sinuate; nervulus postfurcal by more than half its length. 35. *texanus*, new species
- Ovipositor sheaths shorter than height of apical truncature of abdomen; eyes a little divergent below; temples and cheeks rather full, convex; longest segment of maxillary palpus distinctly longer than first segment of antennal flagellum; first abdominal tergite not narrowing from spiracles to base, the spiracles very prominent; radiella strongly sinuate, radiellian cell very narrow at middle; nervulus usually only very weakly postfurcal----- 36. *uniformis* Provancher

I. *MACROCENTRUS INCOMPLETUS*, new species

In the short maxillary palpi, the unusually short and broad face, the strongly convex vertex, the broad temples and cheeks, the non-prominent eyes, and the absence of distinct teeth on the outer apical margins of the trochanters, this species most closely resembles *crassipes*, but it is at once distinguished from all other known North American species of *Macrocentrus* by the absence of the second intercubitus, the strongly inclivous nervellus, the unusually short lower abscissa of basella, and the small number of segments in the antennae; from *crassipes* it differs further in having very slender legs and in the much smoother thorax and abdomen.

Female.—Length 3.5 mm. Head less transverse than is usual in *Macrocentrus*, the temples conspicuously broad and bulging; eyes small and not extending beyond the outer limits of the temples, but situated low so that malar space is short and the vertex broad and strongly convex; face more than twice as broad as long; mandibles long; clypeus fully three times as broad at apex as long, the anterior margin truncate; interfoveal line twice the length of clypeus; maxillary palpi scarcely as long as height of head, the longest segment much shorter than the scape; face, clypeus, frons, temples, and cheeks smooth and polished; ocelli small, ocell-ocular line nearly three times the diameter of an ocellus; antennae very nearly as long as the body, 27-segmented in type.

Thorax rather stout; middle lobe of mesoscutum elevated a little above the level of lateral lobes; mesopleura polished; metapleura smooth; propodeum mostly smooth, weakly roughened down the middle and at apex; legs very slender; trochanters without teeth outwardly at apex; longer calcarium of posterior tibia less than one-third the basitarsus; anterior wing with second intercubitus wanting; the radius usually not distinctly divided into three abscissae; first discoidal cell much longer than first cubital; veins in apical third of wing faint; nervulus very weakly postfurcal; submedian cell closely hairy; posterior wing with nervellus strongly inclivous, usually about twice as long as lower abscissa of basella, the latter hardly one-fourth the mediella; radiella faint.

Abdomen as long as head and thorax combined, somewhat compressed at apex, smooth and polished, with only very faint suggestion of sculpture on first tergite; first tergite more than twice as long as broad at apex; ovipositor sheaths longer than the abdomen but distinctly shorter than the thorax and abdomen combined.

Head black; clypeus, and the mandibles except at apex, ferruginous; antennae piceous to blackish; thorax yellow-ferruginous, with the metanotum, propodeum, and more or less of the pleura piceous to blackish; abdomen piceous, blackish at apex; legs entirely testa-

ceous; wings whitish hyaline, veins and stigma brownish, the latter with a pale yellow spot at base.

Male.—Essentially as in the female except that antennae are a little more slender at apex and the legs a little tinged with piceous; antennae of allotype 28-segmented.

Type.—U.S.N.M. No. 43489.

Type locality.—Garden City, Kans.

Host.—"Cutworm larva."

Remarks.—Described from two females and one male reared May 8, 1914, by F. B. Milliken in the Bureau of Entomology under Chittenden No. 2508, and four females collected on wheat at Guymon, Okla., April 24, 1930, by W. E. Jackson and C. F. Stiles. The National Museum has 20 additional specimens, which are not included in the type series, from Colorado (C. F. Baker collection), one from Wellington, Kans. (E. G. Kelly), and one from McCook, Nebr. This material shows the number of segments in the antennae to range from 25 to 30; there is also considerable variation in the extent of the piceous coloring of the thorax, but the pronotum and mesoscutum are usually somewhat paler than the remainder of the thorax.

2. MACROCENTRUS CRASSIPES, new species

Exceedingly similar to the European *infirmus* (Nees), as represented by two specimens so determined in the United States National Museum, but apparently differing in the longer calcaria of posterior tibiae, in the slightly more transverse head, and in the nervellus being perpendicular to the mediella. It is possible that the two are identical, but with so little material of either form available I am unable definitely to identify as *infirmus* the species here described.

Female.—Length 4.5 mm. Head only a little wider than thorax, vertically short, the face between antennal foramina and clypeus much less than half as long as broad; temples and cheeks rounded, broad; clypeus strongly convex, elevated anteriorly; interfoveal line about equal to foveo-ocular line; eyes small, broadly oval, not extending beyond the outer line of the temples, and situated low so that vertex is very broad and strongly convex, rising much above the level of upper margins of the eyes; ocelli very small; postocellar line more than twice, the ocell-ocular line more than four times, the diameter of an ocellus; maxillary palpi short, not longer than height of head, the longest segment shorter than the scape; labial palpi very short, the apical segments but very little longer than broad; face a little punctate medially; antennae distinctly shorter than the body, 33-segmented, the second segment of flagellum only twice as long as broad; scape short and stout.

Thorax with middle lobe of mesoscutum not rising distinctly above level of lateral lobes; notauli distinctly foveolate only posteriorly; propodeum completely rugulose and opaque; sides of pronotum mostly rugulose; mesopleura confluent punctate below; metapleura mostly punctato-rugulose; legs shorter and stouter than is usual in *Macrocentrus*; all femora short and somewhat thickened; anterior metatarsus not distinctly half the anterior tibia; apical segment of anterior tarsus as long as the second; calcarium of anterior tibia about half the metatarsus; longer calcarium of posterior tibia half the posterior metatarsus; trochanters without distinct teeth outwardly at apex; stigma emitting radius from slightly beyond its middle; radial cell short, ending much before wing apex; first discoidal cell much longer than first cubital; nervulus almost interstitial; submedian cell closely hairy apically; mediella slightly more than twice the lower abscissa of basella, the latter longer than nervellus; radiellian cell not widening apically.

Abdomen slightly longer than head and thorax combined, weakly compressed apically; first tergite about twice as long as wide at apex, impressed at base, delicately ruguloso-aciculate longitudinally, with a distinct though shallowly impressed line down the middle; second tergite about as long as broad at apex, finely longitudinally aciculate on basal half, polished on apical half; remainder of dorsum of abdomen smooth and polished; ovipositor sheaths slightly longer than the body.

Head black; mandibles except tips testaceous; palpi a little dusky; antennae brownish yellow on basal half, blackish apically; thorax entirely black; legs uniformly honey-yellow; wings with a faint dusky tinge; veins and stigma brown, the latter pale at base; abdomen black; ovipositor sheaths brown.

Male.—Agrees with the female except for the usual sexual differences. The antennae of the allotype are 38-segmented and are blackish.

Type.—U.S.N.M. No. 43490.

Type locality.—Lake Placid, N. Y.

Remarks.—Described from one female and one male collected August 15, 1896. There are four additional specimens in the United States National Museum not included in the type series, labeled "Chelsea, Vt., 14-VII-15, H. E. Smith, collector, W. Springfield No. 915525," and two recorded as reared from *Hadena devastatrix* Brace, at Bozeman, Mont., August 5, 1909. These six are considerably smaller than the types but otherwise appear to be indistinguishable.

3. MACROCENTRUS CRAMBIVORUS Viereck

Macrocentrus (Amicroplus) crambivorus VIERECK, Proc. U. S. Nat. Mus., vol. 40, p. 183, 1911.

Macrocentrus (Amicroplus) plesius VIERECK, Proc. U. S. Nat. Mus., vol. 44, p. 556, 1913. (New synonymy.)

Types.—In the United States National Museum.

In his description of *plesius*, Viereck called attention to the similarity of that species to *crambivorus*, but apparently he did not appreciate the extent to which variation occurs in species of *Macrocentrus*. In my opinion the types of the two species are clearly conspecific, and it may become necessary to suppress both names as synonyms of *crambi* Ashmead, but owing to the apparent constancy of certain differences *crambivorus* is for the present being held distinct. The eyes in general are smaller than in *crambi*, and the cheeks and temples correspondingly broader and less strongly receding, the malar space longer, and the face slightly broader; the female antennae appear constantly to have fewer segments, as noted in the key, and to be a little darker in color; the male antennae are similar in the two species, being usually 36 to 39 segmented with the flagellum entirely brown, but the thorax of males of *crambivorus* seems to be consistently darker in color than in *crambi*; in general the lower abscissa of basella, as compared with the upper abscissa, is relatively longer in *crambivorus*, but this difference is not dependable.

The material examined includes, in addition to the type series of *crambivorus* and *plesius*, series in the national collections reared from crambid larvae taken at Mount Jackson, Va., and Elmore, Ohio; three specimens obtained from *Crambus hortuellus* Hübner at Wareham, Mass.; another series reared from a *Crambus* larva on corn, locality not noted; and collected specimens from Virginia, Massachusetts, Pennsylvania, District of Columbia, Georgia, Illinois, Iowa, South Dakota, Colorado, and Canada; also a single specimen from Michigan at the corn-borer laboratory, at Arlington, Mass.; and a series of 12 specimens from Marthas Vineyard, Mass., in the collection of the Boston Society of Natural History.

4. MACROCENTRUS CRAMBI (Ashmead)

Amicroplus crambi ASHMEAD, Journ. Cincinnati Soc. Nat. Hist., vol. 17, p. 48, 1894.

Type.—In the United States National Museum.

The close relationship between this species and *crambivorus* has been discussed above under the latter name. *M. crambi* is also somewhat similar to *collaris* (Spinola) Nees, which was designated by Foerster as the type of his genus *Amicroplus*, but differs in its more slender form, smaller head, and much longer ovipositor.

In addition to the type, which is a male from Indiana reared from *Crambus zeellus* Fernald, the United States National Museum has specimens from Virginia, Tennessee, Indiana, and Pennsylvania, as well as some without locality data. Hosts recorded for specimens among this material include *Crambus mutabilis* Clemens, *C. trisectus* Walker, and *C. zeellus* Fernald.

5. **MACROCENTRUS TERMINALIS** (Ashmead), new combination

Zele terminalis ASHMEAD, Proc. U. S. Nat. Mus., vol. 11, p. 652, 1888.

Type.—In the United States National Museum.

This species, which is known only in the male, is very similar to *pyraustae*, differing, however, in having the metapleurum and propodeum even more completely and more strongly sculptured, in the roughened prepectus, in having the basal abdominal tergites yellow, in the broader face, and in the longer malar space, which is about as long as the clypeus.

Face nearly twice as broad as long to base of clypeus; eyes small; temples and cheeks somewhat rounded; antennae usually 38 to 42 segmented; scape, in the male, somewhat swollen; longest segment of maxillary palpus hardly as long as second segment of antennal flagellum; labial palpi much longer than face, the apical segment much lengthened; notauli foveolate; metapleura completely rugulose; propodeum coarsely reticulate; apical teeth of trochanters weak, indistinct; first discoidal cell very long; mediella about twice lower abscissa of basella; first abdominal tergite at least a third as long as the abdomen, longitudinally aciculate, the spiracles much farther from base than from each other; sculptured part of second tergite somewhat constricted at the middle; legs, as well as scape and pedicel, deep honey-yellow.

The above notes are based on the type, which is from Missouri; on five additional collected specimens in the national collection from Illinois, Minnesota, New York, Pennsylvania, and Massachusetts, respectively; and on three specimens, in the Philadelphia Academy of Natural Sciences, from New Jersey and Illinois. The specimen from New Jersey has the thorax almost entirely yellow.

6. **MACROCENTRUS LONGICORNIS** Provancher

Macrocentrus longicornis PROVANCHER, Nat. Can., vol. 12, p. 173, 1880.

Type.—In the Museum of Public Instruction, Quebec, Canada.

I have not seen the type of this species, but in the collection of the United States National Museum there are three specimens from Cleveland, Ohio, and one from Itasca State Park, Minn., which ap-

pear to agree so completely with the original description, and with notes made by S. A. Rohwer in 1915 on an examination of the type, as to leave little doubt that they are *longicornis*. The species, as represented by these specimens, is most similar to *pyraustæ* and *harrisi*, but it can be readily separated by the characters mentioned in the key. The following additional notes are likewise based on the specimens in the National Museum: Malar space shorter than basal width of mandible; cheeks and temples rounded, full; antennae 37 to 44 segmented; ocell-ocular line twice the diameter of an ocellus; mandibles quite long, the apices crossing; face short and broad, nearly twice as broad as long; clypeus rather large, strongly convex; entire insect black except palpi, scape and pedicel of antennae, mandibles, legs, and the three basal sternites of the abdomen.

7. MACROCENTRUS PERONEAE, new species

Most similar to *harrisi*, but at once distinguished by its unusually short and relatively broad radial cell, the blackish abdominal sternites, the broader depressed lateral margins of second tergite, and by the lower abscissa of basella being scarcely longer than nervellus and scarcely half as long as mediella.

Female.—Length 4.5 mm. Head rather small, only very slightly wider than thorax; eyes broadly oval, not large; temples strongly receding; cheeks rounded; face broad, smooth, impressed medially above and with a short low ridgelike elevation just below this impression; clypeus small, convex, apically truncate; malar space fully as long as basal width of mandible; ocell-ocular line nearly twice diameter of an ocellus; maxillary palpi long, longest segment slightly longer than second flagellar segment; antennae longer than the body, 46-segmented.

Thorax with propodeum delicately rugulose; pleura smooth, except metapleura at apex; metapleural tooth not distinct; legs very slender; longer calcarium of posterior tibia hardly one-third the basitarsus; trochanters with the apical teeth minute, indistinct; stigma large, broad, emitting radius from very slightly beyond middle; radial cell unusually short, ending far before wing apex, measured on wing margin scarcely longer than stigma and not more than one and one-half times as long as broad; submedian cell closely hairy apically; nervulus postfurcal by less than half its length; radiellian cell long, not widening apically.

Abdomen longer than head and thorax combined; first tergite hardly twice as long as broad at apex, finely longitudinally aciculated; second slightly longer than broad at apex, also longitudinally aciculated, the depressed lateral margins broadest at base, the sculp-

tured part broadening gradually behind; third tergite aciculate on basal half; remainder of dorsum of abdomen smooth; ovipositor sheaths distinctly longer than the body, very slender.

Black; head black; clypeus brownish; palpi more or less dusky; antennae blackish, including scape and pedicel; thorax black with brownish tinge on sides of pronotum and on metapleura; wings hyaline; veins and stigma dark brown, the latter indistinctly paler at extreme base; legs brownish yellow; posterior femora at apex, posterior tibiae except at base, and all tarsi, blackish; abdomen black; second and third tergites with a faint brownish tinge; three basal sternites of abdomen piceous-black, the following black.

Type.—U.S.N.M. No. 43491.

Type locality.—Ottawa, Ontario, Canada.

Host.—*Peronea variana* Fernald.

Remarks.—Described from three female specimens reared by K. E. Schedl.

8. MACROCENTRUS HARRISI De Gant

Macrocentrus harrisi DE GANT, Proc. Ent. Soc. Washington, vol. 32, p. 164, 1930.

Type.—In the United States National Museum.

Exceedingly similar to *pyraustae*, but differing especially in the longer malar space, which is about as long as the clypeus, and in the darker abdomen, as noted in the key. Face broad, rather strongly transversely convex; eyes small; temples and cheeks rounded; ocelli very small, ocell-ocular line more than twice the diameter of an ocellus; antennae usually 42 to 48 segmented; notauli punctate; propodeum granularly rugulose; mesopleura mostly smooth, polished; metapleura rugulose on posterior half; apical teeth of trochanters minute, indistinct; nervulus slightly postfurcal; first discoidal cell very long; mediella less than twice as long as lower abscissa of basella, which is more than one and one-half times, sometimes nearly twice, as long as nervellus; three basal abdominal tergites closely longitudinally aciculate. Black; clypeus more or less reddish; scape and pedicel, palpi, base of mandibles, and the three basal sternites of abdomen, pale yellow; legs yellow, except the posterior tibiae outwardly and all the tarsi, which are more or less infuscated. Very rarely the thorax is pale beneath.

The material examined consists of the type and 10 additional specimens in the National Museum representing a range in distribution from the District of Columbia and New York to Colorado and northward to Alberta; two specimens in the collection of the Boston Society of Natural History from Mount Washington, N. H., and Mount Desert, Me., respectively; and 26 specimens from various New England localities at the gipsy moth laboratory, Melrose Highlands,

Mass. Three specimens in the national collection, from Washington, D. C., are recorded as having been reared from *Cacoecia parallela* Robinson, while among the material at the gipsy moth laboratory are 12 males reared from *Cacoecia purpurana* Clemens taken at Brewer, Me., and 4 males obtained from *Exartema fasciatana* Clemens taken at Orrington, Me.

This species is evidently exceedingly similar to *nigridorsis* Viereck; in fact, I suspect that the two may be identical and that it may become necessary to suppress *harrisi* as a synonym, but since I have not seen the type or authentic material of *nigridorsis* I am for the present recognizing *harrisi* as valid.

9. MACROCENTRUS PYRAUSTAE Viereck

Macrocentrus pyraustae VIIECK, Connecticut Geol. and Nat. Hist. Surv. Bull. 22, p. 220, 1917 (1916).

Type.—In the Connecticut Agricultural Experiment Station at New Haven.

The characters that will distinguish *pyraustae* from *terminalis* and *harrisi*, both of which it closely resembles, have been mentioned in the discussion under those species or in the key. From *gifuensis*, which is also very similar, it differs principally in color as indicated in the table to species; but the mandibles, though short, are hardly as short as in *gifuensis*, distinctly crossing at the tips; the temples and cheeks are a little more strongly receding and the radial cell slightly shorter.

Antennae long, usually 43 to 46 segmented; maxillary palpi long, but the longest segment not distinctly so long as second segment of antennal flagellum; prepectal carina strong, complete; metapleura usually rugose on posterior half; propodeum mostly rugulose; apical teeth of trochanters minute, indistinct; radial cell ending considerably before apex of wing; first discoidal cell very long; abdomen very slender, the first tergite usually more than three times as long as wide at apex, and the second tergite in the female nearly twice as long as wide; ovipositor sheaths as long as the body. Head and thorax black or blackish; antennae blackish with scape and pedicel yellow; usually apex of scutellum and the surrounding parts brownish; abdomen black with third tergite bright testaceous, and often the second more or less pale; legs yellow, with posterior tibiae weakly infuscated.

The above discussion and descriptive notes are based on the type, two paratypes in the Philadelphia Academy of Natural Sciences, two paratypes, and two additional specimens reared from "a tortricid in turtle-head," at Ithaca, N. Y., in the national collection; and 31 specimens at the gipsy moth laboratory, which were reared from

Pyrausta pertextalis Lederer taken at Bedford and Hudson, Mass. The type series is recorded as apparently having been parasitic on *Pyrausta theseusalis* Walker.

10. *MACROCENTRUS GIFUENSIS* Ashmead

Macrocentrus gifuensis ASHMEAD, Proc. U. S. Nat. Mus., vol. 30, p. 191, 1906.

Type.—In the United States National Museum.

The following discussion and descriptive notes apply to the species that has been recently introduced into the United States from Europe and Japan as a parasite of the European corn borer (*Pyrausta nubilalis* Hübner), and has become established at several points in the area infested by that pest. I am not altogether satisfied that this parasite is identical with *gifuensis*, but owing to the variability within species of *Macrocentrus*, and to the fact that the two specimens comprising the type series of *gifuensis* appear to be somewhat abnormal, it seems advisable for the present to continue the use of this name for the parasite of the corn borer.

Very similar to *harrisi* and *pyraustae* but separable by the characters mentioned in the key and in the comments under those species. Face sparsely shallowly punctate; clypeus long, at least half as long as face; mandibles short, not, or scarcely, meeting at tips, the teeth very short; longest segment of maxillary palpus distinctly shorter than second segment of flagellum; malar space only about half as long as clypeus; ocell-ocular line more than twice diameter of an ocellus; antennae normally 40 to 44 segmented; notauli foveolate; propodeum finely rugulose, also metapleura posteriorly; apical teeth of trochanters minute, indistinct; radius arising from about middle of stigma; radial cell going nearly to wing apex; nervulus a little postfurcal; first discoidal cell very long; mediella hardly twice lower abscissa of basella, the latter usually about twice the nervellus; abdomen slender; first tergite in female about three times as long as broad at apex, relatively a little shorter in the male; first, second, and basal half of third, tergites longitudinally aciculate; ovipositor sheaths as long as the abdomen.

There is much variation in color: The head is always black, but the color of the thorax ranges from entirely testaceous to mostly black, with only the venter, the pleura below, and usually the pre-scutum, pale; usually at least the pronotum is blackish or somewhat infuscated; the abdomen is usually black or blackish with the third, or the second and third tergites mostly pale; sometimes the first tergite is also mostly yellowish; the legs are yellow; the wings hyaline.

Many specimens reared from *Pyrausta nubilalis* and received at the European Corn Borer Laboratory, Arlington, Mass., from Europe and Japan have been examined.

11. *MACROCENTRUS AMICROPLOIDES* Viereck

Macrocentrus amicroploides VIERECK, Proc. U. S. Nat. Mus., vol. 43, p. 579, 1912.

Type.—In the United States National Museum.

This species, which is a common gregarious parasite of various leaf-rollers, is relatively easily distinguished from all related forms by having the base and apex of stigma conspicuously pale, by the larger eyes and ocelli, by the narrower face, and by the color of the head and thorax. Eyes large; malar space usually less than basal width of mandible; face but very little or no broader than long; ocell-ocular line hardly one and one-half times as long as diameter of a lateral ocellus; longest segment of maxillary palpus a little longer than second segment of antennal flagellum; antennae normally 42 to 48 segmented; male scape somewhat swollen; propodeum finely rugulose; metapleura roughened posteriorly; apical teeth of trochanters minute, indistinct; radius arising from very slightly beyond middle of stigma; submedian cell closely hairy, not glabrous apically; mediella twice the lower abscissa of basella, the latter distinctly longer than nervellus; abdomen very slender, first, second, and usually most of third, tergites closely longitudinally striate; the first deeply excavated at base; second tergite much longer than broad, the lateral depressed margins very narrow; third tergite usually longer than broad, at least in the female; ovipositor sheaths slightly longer than the body.

In color the species is extremely variable. The color of the head ranges from entirely yellow to mostly black; nearly always at least occiput and vertex are blackish, the face more or less brownish and never entirely black; the thorax also varies from entirely testaceous to mostly black, but the sternum and lower part of pleura are virtually always pale, with the pronotum never blackish even in the darkest specimens; dorsum of abdomen most frequently black, although sometimes mostly yellowish; in the darkest specimens the sternites, too, are blackish; legs entirely yellow; wings hyaline, veins brownish, stigma brown, conspicuously pale at base and at apex and usually along anterior margin.

The national collection contains many specimens representing a range in distribution from Massachusetts to California; in addition to the type, two from Darby, Mont., are recorded as having been reared from *Cacoecia argyrospila* Walker, and two from St. Annes, Quebec, as having been obtained from *Tmetocera ocellana* Schiffermüller. Much additional material in the collection of the gipsy-moth laboratory has been examined. This includes series reared from *Cacoecia rosaceana* Harris, *C. rosana* Linnaeus, *Pyrausta pertextalis* Lederer, and *Harpipteryx frustrella* Walsingham, taken at various New England localities.

12. *MACROCENTRUS CROCIDOPHORAE*, new species

Closely resembles *amicroploides* but may be distinguished particularly by its unicolorous stigma, interstitial nervulus, and shorter mandibles. In the unusually short mandibles it resembles *gifuensis*, but differs from that species in having the head yellow and the nervulus interstitial.

Male.—Length 4 mm. Eyes large, prominent; face but little broader than long, smooth; temples not broad, receding; clypeus strongly convex; distance from clypeal foveae to eyes shorter than length of clypeus; ocell-ocular line less than twice the diameter of an ocellus; maxillary palpus long, the longest segment as long as the second flagellar segment; the two apical segments of labial palpus long; antennae very long and slender, 43-segmented; scape large, somewhat swollen.

Thorax slender, narrowing strongly anteriorly; prothorax narrow; middle lobe of mesoscutum prominent; notauli coarsely foveolate; scutellar furrow pitlike, considerably longer than half the scutellum; scutellum less than half as long as propodeum, which is rather long and narrow, transversely rugulose, the rugae prominent; metapleura rugose posteriorly; legs slender; longer calcarium of posterior tibia much less than half the basitarsus; basitarsus of anterior legs not more than half the tibia; radius arising from middle of stigma; radial cell going very nearly to apex of wing; first discoidal cell very long; submedian cell closely hairy; nervulus interstitial; mediella not distinctly twice as long as the lower abscissa of basella, the latter one and one-half times the nervellus, which is but very slightly longer than nervulus; radiella straight; radiellian cell a little the widest apically.

Abdomen very slender, longer than head and thorax; first tergite more than twice as long as wide, deeply impressed at base, irregularly longitudinally aciculated; spiracles of first tergite at end of basal fourth; second tergite longer than broad, parallel-sided, completely closely aciculate, the lateral depressed margins very narrow; third tergite also mostly aciculate; rest of dorsum of abdomen smooth.

Testaceous; vertex and occiput brownish; palpi pale; antennae brownish black, scape and pedicel yellow; fourth and following abdominal segments piceous; wings hyaline; stigma brown, without a pale spot at base; veins pale brown; legs entirely yellow.

Type.—U.S.N.M. No. 43492.

Type locality.—Baton Rouge, La.

Host.—*Crocidophora pustuliferalis* Lederer.

Remarks.—Described from three male specimens reared September 5, 1928, by H. Spencer.

13. MACROCENTRUS ATRATUS, new species

Agrees with *impressus* and differs from all other related species in having lower abscissa of basella longer than nervellus and about half as long as mediella. It is at once distinguished from *impressus*, however, by being mostly black.

Female.—Length 5.5 mm. Head a little wider than thorax; eyes very large; malar space much less than basal width of mandible; face strongly impressed medially above, mostly smooth except just above clypeus where it is closely finely punctate; clypeus strongly convex, truncate at apex; ocell-ocular line hardly one and one-half times the diameter of an ocellus; temples and cheeks very narrow, strongly receding; maxillary palpus long, the longest segment much longer than second segment of antennal flagellum and nearly as long as the first; apical segment of labial palpus much lengthened; antennae longer than the body, 49-segmented.

Thorax with prescutum prominently convex, descending abruptly in front; notauli foveolate only behind; propodeum finely sculptured except at base, more or less delicately obliquely aciculate; metapleural tooth prominent; mesopleura not impressed below, smooth, shining, with only scattered punctures; teeth outwardly at apex of trochanters conspicuous; stigma rather long, much more than twice as long as wide, emitting radius from much beyond middle; radial cell ending considerably before wing apex; first abscissa of cubitus straight, the second about half as long as recurrent; first discoidal cell very long, much longer than first cubital; nervulus postfurcal by scarcely half its length; submedian cell weakly hairy apically; lower abscissa of basella half as long as mediella and somewhat longer than nervellus; radiellian cell widening slightly apically.

Abdomen a little longer than head and thorax combined; first tergite twice as long as broad at apex, impressed at base, finely longitudinally aciculate, the spiracles beyond basal fourth; second tergite longer than broad, finely longitudinally aciculate, the smooth lateral depressed margins narrow at base, the sculptured part of the tergite as wide at base as at the middle; third tergite longitudinally aciculate on basal half; ovipositor sheaths a little longer than the body.

Head black; clypeus entirely ferruginous; palpi whitish; mandibles whitish at base; basal half of antenna, including scape and pedicel, brownish black, apical half paler; thorax blackish, with sternum and pleura mostly brownish yellow or ferruginous; legs yellow; wings hyaline; stigma and veins brown, the former not pale at base; abdomen black.

Type.—U.S.N.M. No. 43498.

Type locality.—Ithaca, N. Y.

Paratype locality.—Bar Harbor, Me.

Remarks.—Described from two female specimens, the type with only locality data, the paratype collected by C. W. Johnson on July 20, 1919. The latter specimen is in the collection of the Boston Society of Natural History. I have also seen a specimen of this species, from Pennsylvania, in the Philadelphia Academy of Natural Sciences.

14. *MACROCENTRUS IMPRESSUS*, new species

Superficially very similar to *delicatus*, but at once distinguished by the distinct impression at base of first tergite. Structurally most closely related to *atratus*, differing principally in its entirely yellow color.

Female.—Length 7.5 mm. Head a little broader than thorax; face medially impressed on upper half; lower part of face with scattered, very shallow punctures; clypeus convex, truncate at apex; malar space a little shorter than basal width of mandibles; eyes large, prominent; summit of vertex but little above level of upper eye margins; ocelli rather large; ocell-ocular line less than one and one-half times the diameter of ocellus; temples and cheeks very narrow; maxillary palpi long, the longest segment much longer than second segment of antennal flagellum and nearly as long as the first; antennae of type broken.

Thorax with prescutum strongly convex, prominent; notauli foveolate posteriorly; propodeum entirely finely reticulato-rugulose, most weakly sculptured at base; mesopleura with scattered well-separated punctures on lower half; metapleura smooth; calcaria of posterior tibiae thick; radius arising from much beyond middle of stigma; radial cell ending well before wing apex; metacarpus extending the length of second intercubitus beyond apex of radial cell; first discoidal cell very long; first abscissa of cubitus straight, the second nearly half as long as recurrent; nervulus postfurcal by about half its length; submedian cell with a hairless area apically; basal vein hardly curved; mediella less than twice as long as lower abscissa of basella, the latter much longer than nervellus; radiellian cell broadening slightly apically.

Abdomen slightly longer than head and thorax combined; basal impression of first tergite extending beyond line of spiracles; the spiracles about as far from base of tergite as from each other; first tergite finely longitudinally striate; second longer than broad, completely closely longitudinally aciculate except on the narrow lateral depressed margins, the sides of the raised sculptured part slightly emarginate at the middle; third tergite longer than broad, closely finely aciculate on basal two-thirds; ovipositor sheaths distinctly longer than the body.

Testaceous; head entirely yellow except the ocellar triangle which is black; antennae yellow; palpi very pale yellow; thorax and abdomen honey-yellow; legs bright honey-yellow; wings hyaline; veins brown; stigma entirely yellow.

Type.—U.S.N.M. No. 43499.

Type locality.—Pennsylvania.

Remarks.—Described from four female specimens, the type and two paratypes, labeled "Pa. 1573, C. F. Baker collection," which are in the National Museum, and one paratype in the collection of the Boston Society of Natural History, which was taken on the island of Marthas Vineyard, Mass., July 29, 1929, by F. M. Jones. This specimen has the antennae 55-segmented.

15. MACROCENTRUS RETICULATUS, new species

Distinguished from all related species by the unusually strongly rugoso-reticulate propodeum and the coarse sculpturing of the metapleura, combined with a long, closely ruguloso-aciculate first tergite with the spiracles near end of basal third.

Female.—Length 5.5 mm. Head but little wider than greatest width of thorax; face scarcely convex, smooth; eyes large, very prominent; malar space fully as long as basal width of mandible; clypeus strongly convex, not more than one and one-half times as broad as long, weakly broadly emarginate at apex; maxillary palpi long, the longest segment longer than second segment of antennal flagellum; antennae longer than the body, 46-segmented.

Thorax rather stout, broadest posteriorly; prescutum strongly convex, prominent; notauli foveolate posteriorly; propodeum unusually coarsely rugoso-reticulate, the sculpturing not transverse; impression on lateral face of pronotum unusually broad and deep anteriorly and coarsely foveate; lower part of mesopleura conspicuously depressed and strongly confluent punctate; prepectus completely margined and more or less rugulose; metapleura mostly ruguloso-punctate; legs very long and slender; apical teeth of trochanters rather weak; posterior femora longer than coxae and trochanters combined; posterior tibiae very long; radius arising from very slightly beyond middle of stigma; radial cell not quite attaining wing apex; first discoidal cell long; nervulus postfurcal by about half its length or slightly more; submedian cell with a hairless area apically; nervellus very slightly shorter than lower abscissa of basella, the latter a little less than half as long as mediella.

Abdomen slender, considerably longer than head and thorax combined; first tergite long and narrow, nearly three times as long as wide at apex, closely longitudinally ruguloso-striate, subopaque; second tergite much longer than wide, completely closely striate with

only very narrow lateral depressed margins; basal two-thirds of third tergite closely finely striate, subopaque; rest polished; ovipositor sheaths very slender, distinctly longer than the body.

Yellow-ferruginous; base of mandibles and the palpi yellowish white; vertex rather brownish; antennae brown, scape and pedicel testaceous; legs testaceous, with fore and middle coxae and trochanters paler; wings distinctly a little dusky; stigma brown with a pale spot at base; veins brown; apex of abdomen more or less infuscated.

Type.—U.S.N.M. No. 43500.

Type locality.—Coleta, Ala.

Remarks.—Described from four female specimens, collected by H. H. Smith at the type locality, and one additional female taken by R. A. Cushman at Difficult Run, Va., July 30, 1920. This last specimen is larger than the others, measuring 7.5 mm. in length, and is even a little more coarsely sculptured. One paratype has antennae 44-segmented; in the other paratypes they are broken.

16. MACROCENTRUS CANARSIAE, new species

Rather similar to *ancylivorus*, but differing especially in the relatively longer and narrower, and completely striate, second abdominal tergite, in having lateral depressed margins of second tergite very narrow at base, in the third tergite being closely finely striate on basal half or more, and in the metacarpus extending well beyond apex of radial cell. From *insularis*, to which it is even more closely related, it differs as noted in the key.

Female.—Length 4.8 mm. Eyes large; temples and cheeks narrow, receding; malar space scarcely as long as basal width of mandible; face with only a few scattered weak punctures; vertex rising but very little above upper level of eyes; longest segment of maxillary palpus a little longer than second segment of flagellum and longer than scape and pedicel combined; antennae 49-segmented.

Thorax rather short; prescutum usually not especially prominent; notauli foveolate and not distinctly confluent posteriorly; propodeum reticulate posteriorly and weakly rugulose medially at base, smooth laterally on basal half; mesopleura and metapleura mostly smooth, with a few weak scattered punctures; longer calcarium of posterior tibia very nearly half as long as basitarsus; apical teeth of trochanters conspicuous; radius arising from very slightly beyond middle of stigma; radial cell ending well before extreme wing apex; metacarpus extending length of second intercubitus beyond apex of radial cell; first discoidal cell longer than first cubital; second abscissa of cubitus about half as long as recurrent; submedian cell weakly hairy at apex; nervulus postfurcal by barely

half its length; mediella much more than twice the length of lower abscissa of basella, the latter not distinctly as long as nervellus.

Abdomen longer than head and thorax combined, very slender, not half as wide as extreme width of thorax; first tergite more than twice as long as broad at apex, longitudinally striate, its spiracles before end of basal fourth; second tergite longer than broad, completely aciculate, the lateral depressed margins very narrow, not wider at base than at middle of tergite; third tergite about as long as broad, aciculate on basal two-thirds; ovipositor sheaths very slightly longer than the body.

Entirely testaceous except for a weak suggestion of infuscation at apex of propodeum, at base of first tergite, and on apical abdominal tergites; antennal flagellum usually fuscous, the scape and pedicel pale yellow; legs mostly testaceous, posterior coxae infuscated apically above; wings hyaline, veins and stigma brownish, the latter with a pale spot at base.

Type.—U.S.N.M. No. 43502.

Type locality.—Bentonville, Ark.

Host.—*Canarsia* sp.

Remarks.—Described from three female specimens reared in the Bureau of Entomology by D. Isely, July 20, 1918 (type), July 21, 1918, and June 18, 1919 (paratypes), the type and first paratype under Quaintance No. 16392, the second paratype under Quaintance No. 16472.

17. MACROCENTRUS INSULARIS, new species

Most closely related to *canarsiae*, but distinguished by the characters given in the key.

Female.—Length about 7 mm. Face broad, sparsely punctate; eyes large, prominent; malar space hardly as long as basal width of mandible; clypeus about as broad as half the width of face; mandibles stout; ocell-ocular line about one and one-half times as long as diameter of an ocellus; maxillary palpi long, the longest segment distinctly longer than second segment of antennal flagellum; apical segment of labial palpus nearly as long as the two preceding segments combined; antennae 54-segmented.

Thorax rather stout; notauli foveolate behind, propodeum finely rugulose; mesopleura and metapleura mostly smooth, with some scattered shallow punctures; apical teeth of all trochanters well developed; radius arising from distinctly beyond middle of stigma; radial cell rather short, the metacarpus extending the length of second intercubitus beyond apex of radial cell; nervulus postfurcal by about half its length; submedian cell sparsely hairy apically; mediella much more than twice the lower abscissa of basella, the latter hardly as long as nervellus.

Abdomen with first tergite much more than twice as long as broad at apex, closely longitudinally aciculate, the spiracles slightly beyond basal fourth and about as far from base of tergite as from each other; second tergite longer than broad, entirely finely aciculate, the lateral depressed margins very narrow; third tergite about as long as broad, aciculate on basal half; following tergites smooth; ovipositor sheaths as long as the body.

Yellow-ferruginous; palpi pale yellow; antennal flagellum fuscous or blackish; mesonotal lobes and metanotum more or less fuscous or blackish; posterior coxae a little dusky at apex above; wings hyaline, stigma brown, conspicuously paler at base.

Type.—In the collection of the Boston Society of Natural History.

Type locality.—The island of Marthas Vineyard, Mass.

Remarks.—Described from six female specimens taken by F. M. Jones in July and August, 1930. The two paratypes with complete antennae have them 53-segmented. There is more or less variation in the extent of the fuscous or blackish markings of thorax; the posterior coxae are sometimes entirely pale, and occasionally the apex of the abdomen is blackish. Two of the paratypes are deposited in the United States National Museum.

18. MACROCENTRUS CLYPEATUS, new species

Most similar to *robustus* but at once separated by the unusually broad clypeus, the much smaller, nonprominent eyes, and the broader face.

Female.—Length 5.5 mm. Head much wider than thorax, rather lenticular as seen in profile; face broad, nearly or quite twice as broad as long, polished; eyes not large, not prominent, extending but little beyond outer margin of temples; temples and cheeks somewhat rounded; clypeus broader than length of second segment of antennal flagellum; mandibles large, stout, the outer tooth very strongly developed; vertex scarcely convex; ocell-ocular line very nearly twice the diameter of a lateral ocellus; maxillary palpi scarcely longer than width of head, the longest segment not distinctly as long as second segment of antennal flagellum; labial palpi short, about as long as face; antennae 49-segmented.

Thorax rather stout; notauli finely foveolate; propodeum transversely aciculate, smooth at base; mesopleura a little impressed below, smooth, shining, with only a few setigerous punctures; metapleura smooth; prepectus defined only laterally; apical teeth of all trochanters well developed, conspicuous; radius arising from slightly beyond middle of stigma; metacarpus extending hardly beyond apex of radial cell; first discoidal cell considerably longer than first cubital; second abscissa of cubitus nearly half as long as recurrent;

nervulus postfurcal by about half its length; submedian cell with a hairless area apically; mediella nearly three times as long as lower abscissa of basella, the latter a little shorter than nervellus.

Abdomen not, or only indistinctly, longer than head and thorax combined, a little narrower than thorax; first tergite not twice as long as broad at apex, only weakly impressed at extreme base, delicately longitudinally aciculate, the spiracles before end of basal fourth, the distance between them much greater than the distance from spiracles to base of tergite; second tergite hardly as long as broad at apex, delicately aciculate on basal two-thirds, the smooth depressed lateral margins broad at base, the sculptured part of tergite distinctly narrower at the base than at the middle; following tergites smooth; ovipositor sheaths not distinctly longer than the body.

Yellow-ferruginous; head testaceous; palpi yellow; antennae fuscous, scape and pedicel testaceous; thorax yellow-ferruginous; legs yellowish, also the abdomen entirely; wings faintly dusky, veins and stigma brown, the latter broadly yellow at base.

Male.—Agrees with the female in essential respects; the antennae are 48-segmented and the eyes a little smaller.

Type.—U. S. N. M. No. 43505.

Type locality.—Germantown, Pa.

Allotype locality.—Glen Echo, Md.

Paratype localities.—Falls Church, Va.; Avon, N. J.

Remarks.—Described from three females and one male. The type was collected September 25, the allotype, September 19, 1920, by J. C. Bridwell; the paratype from Falls Church, Va., was taken by R. A. Cushman September 24, 1918, while the other paratype was collected on September 27, 1908. This last-mentioned specimen has the antennae 45-segmented and the stigma mostly yellow.

19. MACROCENTRUS ROBUSTUS, new species

Closely related to *ancylivorus*, but distinguished especially by its more robust form, the unusually broad first abdominal tergite, the longer antennae, which are usually 50 to 54 segmented, and the somewhat broader face and clypeus.

Female.—Length 7 mm. Head very strongly transverse, short antero-posteriorly; eyes prominent; malar space a little longer than basal width of mandible; face smooth, with only minute scattered punctures; clypeus large, broad, more than twice as broad as long and fully as broad as length of scape, rather strongly broadly emarginate at apex; mandibles stout; longest segment of maxillary palpus about as long as second segment of antennal flagellum;

apical segment of labial palpus very little longer than the preceding segment; antennae of type broken.

Thorax stout; scutellum large, more than half as long as propodeum; propodeum finely, more or less transversely, sculptured; pronotum laterally polished, without foveae in the depression; mesopleura smooth; metapleura a little roughened on apical half; apical teeth of trochanters well developed, conspicuous; radius arising from a little beyond middle of stigma; nervulus postfurcal by about half its length; submedian cell sparsely hairy apically; nervellus usually a little longer than lower abscissa of basella.

Abdomen stout; first tergite unusually broad, usually not distinctly one and one-half times as long as broad at apex, delicately, irregularly, longitudinally aciculate; distance between spiracles of first tergite usually greater than half the basal width of propodeum; second tergite not quite as long as broad, faintly longitudinally aciculate on basal two-thirds, the depressed lateral margins unusually broad at the base; third tergite much broader than long; third and following polished; ovipositor sheaths about as long as the body.

Yellow-ferruginous; palpi paler; base of mandibles concolorous with face; antennae brown, scape and pedicel paler; propodeum more or less infuscated except anteriorly; first tergite also in part more or less dusky; legs deep testaceous; wings hyaline; stigma brown, conspicuously pale at base, or yellow with a brownish cloud in apical half.

Male.—In the allotype the propodeum is darker than in the type; also the first tergite, except at apex, and the fourth and following tergites are blackish.

Type.—U.S.N.M. No. 43507.

Type locality.—Chatham, Mass.

Host.—*Pyrausta nubilalis* Hübner.

Remarks.—Described from eight females and six males: The type, allotype, and eight paratypes reared in the Bureau of Entomology by R. A. Biron from *P. nubilalis* taken at the type locality; three paratypes reared by D. W. Jones from the same host, taken at Salem, Mass., under Webster No. 16490; and one paratype taken at Glassboro, N. J. I have seen 27 additional specimens, all reared from *P. nubilalis* taken in eastern Massachusetts, in the collection of the corn borer laboratory at Arlington, Mass. In this material the number of segments in the antennae ranges from 50 to 54. There is a little variation in color of thorax and abdomen, but the mesoscutum and the second and third abdominal tergites are always entirely testaceous. In length these specimens range from 5.5 to 7 mm.

20. MACROCENTRUS NIGRIPECTUS, new species

Most similar to *ancylivorus*, but distinguishable by the black markings on mesonotal lobes and mesosternum, by the second tergite being completely aciculate, by the lower part of mesopleura being closely punctate and subopaque, and by the more distinctly foveolate notauli.

Female.—Length 4.2 mm. Face at least one and one-half times as wide as long, convex, smooth, with only a few fine scattered punctures, and with a finely impressed median line above; clypeus strongly convex, not twice as wide as long, subtruncate at apex; eyes prominent, but not large; malar space longer than basal width of mandible; maxillary palpi a little longer than width of head, longest segment hardly as long as second segment of antennal flagellum; labial palpi short, apical segment but little longer than the preceding segment; vertex a little convex; ocell-ocular line twice the diameter of a lateral ocellus; antennae 45-segmented.

Thorax with notauli very finely foveolate; prescutum prominent, descending abruptly in front; scutellum small, hardly half as long as propodeum; propodeum completely finely rugulose, transversely so behind; impression on lateral face of pronotum more or less foveolate; mesopleura impressed and closely punctate on lower half; metapleura finely granularly roughened and subopaque posteriorly; anterior trochanters not longer than their coxae, apical teeth of all trochanters well developed; posterior coxae faintly transversely lineolated; radius arising from barely beyond middle of stigma; first discoidal cell much longer than first cubital; nervulus postfurcal by about half its length; submedian cell closely hairy, without a hairless area apically; mediella much more than twice as long as lower abscissa of basella, the latter about as long as nervellus; upper abscissa of basella but little more than half the lower.

Abdomen only faintly longer than head and thorax combined; first tergite twice as long as broad at apex, a little impressed at extreme base, entirely closely finely longitudinally aciculate, the spiracles much farther from each other than from base of tergite; second tergite also completely aciculate, except on the depressed lateral margins which are broad toward base; third tergite very delicately aciculate, at least medially on basal half; ovipositor sheaths distinctly longer than the body.

Yellow-ferruginous; vertex rather brownish; antennae brownish, blackish toward apex, scape yellowish brown; palpi brown or piceous; mesonotal lobes mostly black; mesosternum blackish posteriorly; legs testaceous; wings subhyaline; stigma yellowish, weakly clouded apically; veins brownish; first abdominal tergite somewhat brownish; apical tergites blackish.

Male.—Similar to the female; antennae of allotype 44-segmented.

Type.—U.S.N.M. No. 43501.

Type locality.—Whitesbog, N. J.

Host.—*Ancylis*, species near *comptana* Frölich.

Remarks.—Described from nine female and six male specimens reared by H. B. Scammell July 30 to August 8, 1916, in the Bureau of Entomology under Quaintance No. 12782. I have seen one other specimen, not part of the type series, which is in the collection of the gipsy moth laboratory and which was taken at North Saugus, Mass., June 14, 1906, by E. A. Back.

21. MACROCENTRUS ANCYLIVORUS Rohwer

Macrocentrus ancylivora ROHWER, Proc. Ent. Soc. Washington, vol. 25, p. 168., 1923.

Type.—In the United States National Museum.

This species is of particular interest to economic entomologists at the present time owing to the apparent importance it has assumed as a parasite of the introduced oriental fruit moth (*Laspeyresia molesta* Busck). It is, however, only one of several species of *Macrocentrus* that are being obtained from the larvae of that pest in the eastern part of the United States, and because of the variation occurring within species and the little attention that has been given to the classification of the species of *Macrocentrus*, some uncertainty has existed regarding the identity of specimens reared from *L. molesta*.

From *delicatus*, which in some areas appears to be at least as important a parasite of the fruit moth as *ancylivorus*, the latter is easily distinguished by having the first tergite more or less impressed at base, with the spiracles not beyond the basal fourth, while in *delicatus* there is not even a suggestion of an impression at base of first tergite and the spiracles are much beyond the basal fourth; in addition, the stigma of *delicatus* is always pale yellow, the radius arises from much beyond the middle of stigma, the nervulus is usually postfurcal by as much as its own length, and the antennae are usually 48 to 55 segmented; *ancylivorus* has the stigma usually brown, with a large pale spot at base, the radius arising from only slightly beyond middle of stigma, the nervulus never postfurcal by as much as its own length, and the antennae usually 42 to 48 segmented.

From *instabilis* and *laspeyresiae*, which are rather less commonly reared from *L. molesta*, *ancylivorus* is sometimes less easily distinguished. It differs from both species, however, in the shorter palpi, the longest segment of maxillary palpus being no longer, usually shorter, than the second segment of the antennal flagellum,

and the apical segment of the labial palpus being but little longer than the preceding segment. In having the nervulus postfurcal by distinctly less than its length, the mesonotum completely testaceous without blackish markings on the lobes, the second and third tergites always entirely testaceous, the base of mandibles testaceous rather than yellowish white, and the male scape not strongly enlarged, *ancyllivorus* differs further from most specimens of those two species. Moreover, the second and third abdominal tergites are smoother than is usually true in *instabilis*, while the cheeks are narrower and the antennae usually with fewer segments than in *laspeyresiae*.

The face is usually considerably broader than long, although not so distinctly so in some specimens from the Southern States, in these cases an increase in the size of the eyes being accompanied by a correspondingly narrower face and shorter malar space; antennae usually 42 to 48 segmented, the scape of the male not much thickened; thorax with pleura mostly smooth; first discoidal cell much longer than first cubital; submedian cell usually only weakly hairy apically; mediella nearly three times as long as lower abscissa of basella; second abdominal tergite usually smooth posteriorly, and with the depressed lateral margins broad at base; the third tergite usually smooth or with only faint suggestion of lineolation; ovipositor sheaths as long as the body. Testaceous or testaceo-ferruginous, with more or less of metanotum, propodeum, first tergite, and the fourth and following tergites often more or less blackish or infuscated.

The foregoing discussion and descriptive notes are based very largely on the type series and many other specimens in the national collection representing a range in distribution from New Jersey to Texas and New Mexico. The principal host appears to be *Laspeyresia molesta* Busck; but the type series and some additional specimens were reared from the strawberry leaf-roller (*Ancyllis comptana* Frölich), while others are recorded from the larvae of *Epiblema strenuana* Walker (Moorestown, N. J., 1929), *Canarsia* sp. (Bentonville, Ark., 1919), *Epagoge* sp. (Virginia, 1910), *Homeosoma electellum* Hulst, *Anacamptis* sp. (Texas), and *Carpocapsa pomonella* Linnaeus (New Mexico, 1912); I have also seen considerable additional material, all from *L. molesta*, sent me by H. W. Allen, in charge of the oriental fruit moth investigations of the Bureau of Entomology, at Moorestown, N. J., and by W. E. Britton, of the Connecticut Agricultural Experiment Station. Still other material studied includes collected specimens in the collection of the Boston Society of Natural History, taken on the islands of Nantucket and Marthas Vineyard, Mass., and at Fall River, Mass. (1913); and a

series at the gipsy moth laboratory, reared July, 1917, from *Ex-artema sericorana* Walsingham, taken at Westerly, R. I.

22. *MACROCENTRUS INSTABILIS*, new species

Most similar to *laspeyresiae*, but differing in the usually narrower and smoother face, the shorter malar space, the usually entirely brown stigma, in the mesoscutum posteriorly being usually more sharply emarginate, with the scutellar furrow not strongly transverse, in the relatively longer and narrower second abdominal tergite, the usually stronger sculpturing of second and third tergites, and the somewhat smaller size.

Female.—Length 5 mm. Head strongly transverse, much wider than thorax, eyes large, prominent; malar space shorter than basal width of mandible; face, viewed from in front, not or but little broader than long, entirely smooth and shining; clypeus strongly convex, rather long, broadly very weakly emarginate at apex, smooth; distance from clypeal foveae to eyes less than length of clypeus; palpi slender, longest segment of maxillary palpus distinctly longer than second segment of antennal flagellum, apical segment of labial palpus lengthened; antennae longer than the body, 49-segmented in type.

Thorax slender; prescutum prominent; notauli minutely indistinctly foveolate; propodeum very finely transversely rugulose, smooth at base laterally; sides of pronotum, mesopleura and metapleura polished; coxae polished; apical teeth of trochanters distinct but usually not more than three or four on each trochanter; radius arising from middle of stigma; radial cell extending very nearly to extreme apex of wing; first discoidal cell much longer than the first cubital; nervulus usually postfurcal by as much as its own length; submedian cell with a hairless area apically; mediella nearly three times as long as lower abscissa of basella, the latter just about as long as nervellus and but little longer than upper abscissa of basella.

Abdomen but very little longer than head and thorax combined; first tergite twice as long as broad at apex, closely finely longitudinally aciculate, impressed at base, spiracles a little farther from each other than from base of tergite; second tergite slightly longer than broad, closely finely completely aciculate, the lateral depressions usually narrow at base; third tergite mostly finely aciculate on basal half; rest smooth; ovipositor sheaths a little longer than the body.

Head testaceous; palpi and base of mandibles very pale yellow; antennae mostly yellowish, the basal flagellar segments darker; dorsum of thorax mostly piceous in type; propodeum blackish; pleura

testaceous; mesosternum tinged with brown; legs yellow, usually very pale at base; wings entirely clear hyaline; stigma uniformly brown, only very indistinctly paler at base; dorsum of abdomen mostly black, the apical segments a little paler.

Male.—Not differing in any important respect from the female. The antennae of allotype are 47-segmented; the scape is somewhat swollen, distinctly larger than in the female.

Type.—U.S.N.M. No. 43503.

Type locality.—Harriman, Tenn.

Host.—*Laspeyresia molesta* Busck.

Remarks.—Described from 12 females and 14 males reared by H. G. Butler, September, 1930. The national collection contains, in addition to the type series, one specimen from *L. molesta*, taken at South River, N. J.; three reared from *Laspeyresia funebrana* Treitschke at Washington, D. C. (W. B. Wood); also one reared from *Colocephora malivorella* Riley at the same locality; several from the last-mentioned host taken at Morgantown, W. Va. (E. Gould); a series from *L. molesta* collected at several different points in Ohio; several specimens reared from *Acrobasis caryivorella* Ragonot at College Station, Tex. (S. W. Bilsing); and one from *Acrobasis hebescella* Hulst at Victoria, Tex. I have also seen two specimens reared from *L. molesta*, at Chambersburg, Pa., by J. O. Pepper and J. R. Stear, respectively.

There is much variation in color, the thorax and abdomen ranging from entirely blackish dorsally to completely yellow, and in the palest specimens the stigma is usually yellow rather than brown. In the specimens from Texas, which are the palest, the eyes and ocelli are a little larger than in more northern material.

23. MACROCENTRUS UTILIS, new species

Most closely resembling *laspeyresiae*, but differing especially in having the second tergite completely, and the basal half of the third, closely aciculate, in the more strongly elevated prescutum, in the more strongly transverse head, and in the more uniform yellowish-ferruginous color.

Female.—Length 7.5 mm. Head strongly transverse, temples and cheeks narrow, the cheeks, viewed from the side, not wider than the temples; face rather large, much broader than long, very shallowly sparsely punctate; eyes large, prominent; malar space about as long as basal width of mandible; clypeus quite strongly convex, anterior margin truncate; distance from clypeal foveae to eyes about equal to length of clypeus; lateral ocelli usually not distinctly larger than median ocellus; longest segment of maxillary palpus a little longer than second segment of antennal flagellum; apical segment of labial

palpus much longer than preceding segment; antennae much longer than the body, 54-segmented in type; first flagellar segment very long, a little longer than the eyes.

Thorax rather stout, deep; prescutum very prominent; notauli foveolate posteriorly; scutellum elongate, more than half as long as propodeum; propodeum ruguloso-reticulate; sides of pronotum mostly smooth, the impression straight, weakly foveate; mesopleura smooth above, confluent punctate below; metapleura faintly shagreened, subopaque; posterior coxae delicately transversely lineolated posteriorly; apical teeth of trochanters well developed, conspicuous; radius arising from scarcely beyond middle of stigma; radial cell extending very nearly to extreme apex of wing; submedian cell weakly hairy, with a completely hairless area apically; nervulus post-furcal by nearly its own length; mediella nearly three times as long as lower abscissa of basella, the latter but little longer than the upper abscissa and not distinctly as long as nervellus.

Abdomen distinctly longer than head and thorax combined; first tergite fully twice as long as broad at apex, closely finely aciculate, the spiracles about as far from each other as from base of tergite; second tergite slightly longer than broad, completely closely finely aciculate, the lateral depressed margins narrow, the sculptured part of the tergite not, or scarcely, widening from base to middle; third tergite very nearly as long as broad at apex, delicately aciculate on basal two-thirds; remainder of dorsum of abdomen smooth; ovipositor sheaths a little longer than the body.

Yellow-ferruginous; antennae testaceous, blackish apically, the two or three basal flagellar segments not darker than the following; palpi pale yellow; legs concolorous with body; wings hyaline or subhyaline, stigma brownish yellow, indistinctly paler at base; veins dark brown; propodeum and first abdominal tergite weakly tinged with reddish brown.

Male.—Essentially similar to the female; antennae of allotype 52-segmented, the scape somewhat swollen; flagellum brownish.

Type.—U.S.N.M. No. 43504.

Type locality.—Carlisle, Iowa.

Host.—*Pyrausta ainsliei* Heinrich.

Remarks.—Described from seven female and six male specimens reared by G. C. Decker at the Iowa Agricultural Experiment Station, June, 1926. The national collection contains, in addition to the type series, 14 specimens reared from the same host at Manhattan, Kans., by R. Schopp; and one specimen collected by H. H. Smith at Coleta, Ala. I have also seen four specimens in the collection of the European Corn Borer Laboratory at Monroe, Mich., from Carroll County, Ind., and likewise reared from *P. ainsliei*.

There is very little variation in color in this material, the entire insect being rather uniformly yellow-ferruginous with only the propodeum and first tergite sometimes weakly infuscated. The number of segments in the antennae ranges from 50 to 56.

24. *MACROCENTRUS LASPEYRESIAE*, new species

Very similar to *instabilis*, *utilis*, and *ancylivorus*. The more important differences are discussed under those species.

Female.—Length 6 mm. Head rather large, much broader than thorax; as seen from the side the head appears fully as thick antero-posteriorly at the level of the lower eye margins as at the insertion of antennae, the cheeks being broader than temples; clypeus not especially strongly convex, more than twice as broad as long; distance from clypeal foveae to eyes less than length of clypeus; face usually nearly one and one-half times as broad as long, with well separated punctures; longest segment of maxillary palpus longer than second segment of antennal flagellum; apical segment of labial palpus long; antennae much longer than the body, 53-segmented in the type.

Thorax elongate; prescutum not especially prominent, rather less strongly elevated and descending less abruptly anteriorly than in related species; notauli not distinctly foveolate; scutellum more than half as long as propodeum; propodeum narrowing quite strongly behind, finely granularly rugulose on basal half, except laterally at base where it is mostly smooth, more or less transversely striate apically; sides of pronotum and the pleura smooth, with only scattered punctures; coxae smooth; apical teeth of trochanters strong, conspicuous; trochanters of middle legs usually with six or eight teeth; radius arising from very slightly beyond middle of stigma; radial cell long but not quite attaining extreme apex of wing; metacarpus hardly extending beyond apex of radial cell; submedian cell only very sparsely hairy; nervulus postfurcal by nearly its own length; mediella much more than twice as long as lower abscissa of basella, the latter not distinctly as long as nervellus.

Abdomen a little longer than head and thorax combined; first tergite more than twice as long as broad, with a distinct impression at base, and entirely closely longitudinally aciculate, the spiracles not distinctly beyond basal fourth and farther from each other than from base of tergite; second tergite not distinctly longer than broad at apex, mostly finely aciculate, smooth apically, the depressed lateral margins broad at base, the raised sculptured part of the tergite broadening gradually behind; third tergite smooth, with only faint longitudinal lineolation medially; remaining tergites smooth; ovipositor sheaths as long as the body.

Head yellow; vertex and occiput brownish; antennae brown or brownish yellow, the basal flagellar segments usually more or less blackish; thorax yellow, the mesonotal lobes more or less fuscous or blackish; metanotum and propodeum blackish; legs entirely yellow; wings hyaline; stigma yellow with a large brownish cloud, or brown, broadly pale at base; abdomen yellow, with first tergite black, the second blackish on basal half, the third more or less infuscated medially, the following mostly yellowish.

Male.—Similar to the female, except that the scape is rather conspicuously thickened; antennae of allotype 49-segmented; abdomen more completely blackish above than in the type, and antennae darker.

Type.—U.S.N.M. No. 43506.

Type locality.—Kanawha Station, W. Va.

Host.—*Laspeyresia caryana* Fitch.

Remarks.—Described from six female and five male specimens reared September 7, 1906, by Dr. A. D. Hopkins, at the type locality, and one female and three males reared at Richmond, Ohio, by A. A. Girault.

In addition to the type series, the national collection contains specimens reared from *Laspeyresia molesta* Busck at Moorestown, N. J.; from *Carpocapsa pomonella* Linnaeus in Virginia, Ohio, and Arkansas; from *Acrobasis* species in Texas; from *Rhyacionia rigidana* Fernald at Valparaiso, Fla.; and from *Laspeyresia caryana* at A. and M. College, Miss. There is considerable variation in color, both in the type series and in the additional specimens just mentioned, but nearly always the mesonotal lobes, the metanotum, the propodeum, and the three basal abdominal tergites are at least somewhat infuscated; the stigma rarely is entirely yellowish without a distinct cloud.

25. MACROCENTRUS MELLIPES Provancher

Macrocentrus mellipes PROVANCHER, Nat. Can., vol. 12, p. 172, fig. 19, 1880.

Type.—In the Museum of Public Instruction, Quebec, Canada.

This species, the type of which I have not seen, has been placed in the key on the basis of the original description and supplemental notes made by S. A. Rohwer on an examination of the type in 1915. The United States National Museum contains a single female specimen from Montana, which appears to agree with *mellipes* in structure, sculpture, and color, and although it is somewhat smaller than the type I believe it to be that species. Evidently *mellipes* is very similar to *aegeriae* but can be separated by the characters given in the key.

26. MACROCENTRUS AEGERIAE Rohwer

Macrocentrus aegeriae ROHWER, Proc. Ent. Soc. Washington, vol. 17, p. 56, 1915.

Type.—In the United States National Museum.

Rather easily distinguished from other Nearctic species by the characters ascribed to it in the key. Apparently it is most similar to *mellipes* but differs especially in the black posterior tibiae. It is exceedingly close to the European *marginator* (Nees), and may, in fact, be identical with that species, which is also a parasite of Aegeriidae, but I should like to see additional material of *marginator* before synonymizing *aegeriae* with it.

In length *aegeriae* ranges from 6 mm. to nearly 10 mm. The head is only very little wider than thorax; face broad, punctate; clypeus large; eyes not large; malar space usually longer than basal width of mandible; antennae 41 to 49 segmented; longest segment of maxillary palpus slightly longer than second segment of antennal flagellum; mesopleura closely punctate below; metapleura punctate; apical teeth of middle and posterior trochanters well developed; first cubital cell very large, at least as long as first discoidal; second abscissa of cubitus much more than half as long as recurrent vein; radius arising from far beyond middle of stigma; submedian cell sparsely hairy; nervulus usually postfurcal by less than half its length; mediella usually a little more than twice as long as the lower abscissa of basella, the latter about as long as nervellus; abdomen with first two tergites, and usually more or less of third, aciculate; first tergite strongly impressed at base; ovipositor sheaths fully as long as the body. Black; antennae black; lower part of mesopleura and the mesosternum often ferruginous; legs testaceous, the posterior femora at apex, posterior tibiae except at base, and the posterior tarsi, black; wings subhyaline; stigma entirely brown; veins brown.

The material examined consists of the type and about 30 additional specimens in the national collection from localities in New York, Pennsylvania, Connecticut, Virginia, West Virginia, Michigan, North Carolina, Mississippi, Louisiana, Kansas, Idaho, California, and Washington; and two specimens in the collection of the Boston Society of Natural History, from New Hampshire and Maine, respectively. Hosts recorded in the case of the material in the National Museum include *Synanthedon castaneae* Busck, *S. exitiosa* Say, *S. pictipes* Grote and Robinson, *S. tipuliformis* Linneaus, *S. americana* Beutenmüller, *Proteopteryx bolliana* Slingerland (?), *Laspeyresia cupressana* Kearfott, an undetermined aegeriid larva in flowering dogwood, and an undetermined larva in rhododendron.

27. *MACROCENTRUS PULCHRIPENNIS*, new species

Most closely related to *seminiger*, from which it differs especially in the smaller, nonprominent eyes, the broader face, the broad, very weakly convex clypeus, the shorter palpi, the impunctate pleura, and the paler basal abdominal tergites.

Female.—Length 4.5 mm. Head rather small, in profile lenticular; face very broad, twice as broad as long, temples and cheeks convex; eyes not large, long oval, about one and one-half times as long as wide, not prominent, not distinctly extending beyond outer margins of temples; clypeus short and broad, nearly flat, subtruncate at apex; distance from clypeal foveae to eyes longer than length of clypeus; mandibles long; ocell-ocular line nearly twice diameter of an ocellus; maxillary palpi scarcely longer than height of head, the longest segment shorter than second flagellar segment; labial palpi very short, distinctly shorter than face from antennal foramina to clypeus; antennae unusually slender, only slightly longer than body, 42-segmented.

Propodeum more or less transversely ruguloso-striate, nearly smooth at base; sides of pronotum and the mesopleura and metapleura completely smooth and shining, impunctate; metapleural tooth not distinct; mesosternal suture deeply impressed posteriorly; legs very slender; apical teeth of posterior trochanters very weak, those of anterior and middle trochanters well developed; radius arising from considerably beyond middle of stigma; radial cell rather short, ending much before apex of wing; second abscissa of radius in type shorter than the first, also much shorter than first intercubitus, first cubital cell very long, not distinctly shorter than first discoidal; second abscissa of cubitus fully half as long as recurrent vein; nervulus postfurcal by less than half its length; submedian cell very weakly hairy; the setae of basal half of wing very short and indistinct; mediella more than twice as long as lower abscissa of basella, the latter shorter than nervellus; radiella not sinuate near middle, radiellian cell not widening at apex; upper abscissa of basella interstitial with transverse abscissa of subcostella; fringe of hairs on posterior margin of hind wing unusually short.

Abdomen a little longer than head and thorax combined; first tergite flattened, weakly impressed at base, polished basally, very weakly aciculate on apical half; spiracles not beyond basal fourth, and farther from each other than from base of tergite; rest of abdomen polished, with only very faint suggestion of aciculation basally on second tergite; second and third tergites fused, the second suture altogether wanting; ovipositor sheaths a little longer than the body. Head ferruginous; palpi and antennae blackish, scape and pedicel ferruginous; thorax ferruginous, with propodeum

blackish; legs yellowish brown; wings unusually clear hyaline, iridescent; stigma dark brown with a small pale spot in the membrane at base; abdomen brownish ferruginous, more or less infuscated, the fourth and following tergites black.

Type.—U.S.N.M. No. 43494.

Type locality.—Richfield, Utah.

Remarks.—Described from one female taken at a light trap, June 15, 1929.

28. MACROCENTRUS SEMINIGER, new species

Closely allied to *pulchripennis* but differing as noted in the key and in the discussion under that species. Also very similar to *affinis*, from which it may be distinguished by the entirely black abdomen and black posterior tibiae.

Female.—Length 6.5 mm. Face smooth, with some weak punctures above clypeus, also just below antennae; eyes large, extending prominently beyond outer margins of temples; clypeus strongly convex; distance from clypeal foveae to eyes shorter than length of clypeus; maxillary palpi about as long as width of head; two apical segments of labial palpus subequal; antennae as long as the body or very slightly longer, 39-segmented, tapering to apex. Thorax rather stout, deep; prescutum prominently elevated; notauli distinctly foveolate; propodeum rather broad, strongly convex, irregularly transversely striate, more or less smooth basally; prosternum, sides of pronotum, mesopleura, and metapleura uniformly punctate, shining; coxae polished; calcaria of posterior tibia slender, the longer calcarium nearly half as long as basitarsus; radius arising from beyond middle of stigma; apex of radial cell considerably before wing apex; metacarpus extending about length of second intercubitus beyond apex of radial cell; first discoidal cell slightly longer than first cubital; second abscissa of cubitus half as long as recurrent; nervulus only slightly postfurcal; submedian cell nearly glabrous, with only scattered rather indistinct hairs; mediella more than twice lower abscissa of basella, the latter about equal to nervellus; upper abscissa of basella interstitial with transverse abscissa of subcostella; radiellian cell not broadening at all at apex. Abdomen not distinctly longer than head and thorax combined; first tergite rather stout, hardly twice as long as broad, broadly impressed at base, finely longitudinally aciculate; second tergite only very faintly aciculate at base, not separated from third, the second suture wanting; most of second, and all of following tergites polished; ovipositor sheaths about as long as the body.

Head yellowish ferruginous; antennae including scape piceous; palpi blackish; thorax ferruginous, propodeum brownish black; legs

ferruginous, the posterior coxae apically, the posterior femora, and all tibiae and tarsi, piceous to blackish; abdomen entirely black, including the sternites; wings clear hyaline, stigma dark brown, veins paler.

Type.—U.S.N.M. No. 43495.

Type locality.—San Diego, Calif.

Remarks.—Described from a single female specimen.

29. *MACROCENTRUS AFFINIS*, new species

Very similar to *seminiger*, but differing in the mostly brownish abdomen and yellowish legs, and in the longer palpi.

Female.—Length 5.5 mm. Face smooth, weakly punctate medially; eyes large, very prominent; clypeus rather large, strongly convex, subtruncate apically; distance from clypeal foveae to eyes less than length of clypeus; frons short, maxillary palpi much longer than width of head, the longest segment fully as long as second segment of antennal flagellum; apical segment of labial palpus much longer than the third; antennae a little longer than the body, 44-segmented. Thorax rather narrow, deep; prescutum prominently elevated; notauli not foveolate; scutellum more than half as long as propodeum; propodeum transversely striate, more weakly so basally, smooth at extreme base; prosternum smooth; sides of pronotum only indistinctly punctate; mesopleura flat, not depressed below, uniformly punctate, the punctures well separated; metapleura punctate; hind coxae polished; apical teeth of trochanters well developed; longer calcarium of hind tibia very nearly half as long as basitarsus; radius arising from a little beyond middle of stigma; radial cell ending much before wing apex; metacarpus extending the length of second intercubitus beyond apex of radial cell; first cubital cell about as long as first discoidal; second abscissa of cubitus much more than half as long as recurrent; nervulus postfurcal by half its length; submedian cell almost entirely glabrous, with only a few scattered hairs; mediella more than twice the length of lower abscissa of basella, the latter not quite as long as nervellus; upper abscissa of basella interstitial with transverse abscissa of subcostella; radiellian cell narrowing slightly at apex. Abdomen not distinctly longer than head and thorax; first tergite about twice as long as broad, deeply impressed at base, finely but not closely aciculate; second tergite not distinctly longer than broad at apex, smooth except toward base, where it is very feebly aciculate; remainder of dorsum of abdomen polished; ovipositor sheaths a little longer than the body.

Head yellowish ferruginous, vertex blackish; antennae including scape and pedicel blackish; palpi slightly dusky; thorax brownish varied with black in the depression surrounding scutellum, and on

propodeum; legs entirely yellow; wings clear hyaline; stigma dark brown, veins somewhat paler; abdomen brownish yellow, more or less blackish apically.

Type.—U.S.N.M. No. 43496.

Type locality.—Ithaca, N. Y.

Remarks.—Described from a single female specimen.

30. MACROCENTRUS FUSCIPENNIS, new species

Resembles *pallisteri*, but differs particularly in the unusually small nonprominent eyes, the broader face, the shorter robust abdomen, the relatively shorter second abdominal tergite, and the infumated wings.

Female.—Length 5 mm. Head rather thin antero-posteriorly; eyes unusually small, hardly half the height of head, and scarcely extending beyond outer margins of temples; face fully twice as broad as long, polished; malar space as long as clypeus; clypeus strongly convex, the distance between clypeal foveae hardly equal to distance from foveae to eyes; mandibles large; vertex convex, rising considerably above upper level of eyes; ocell-ocular and post-ocellar lines subequal, about twice the diameter of a lateral ocellus; maxillary palpi slightly longer than width of head, the longest segment not distinctly as long as second segment of antennal flagellum; antennae slightly longer than the body, 45-segmented.

Thorax rather stout; prescutum prominent, rather abruptly declivous in front; scutellar furrow not large; scutellum more than half the length of propodeum; propodeum broad, delicately rugulose, with some irregular, transverse raised lines on posterior half, the lateral carinae complete, strong; sides of pronotum, and the mesopleura and metapleura, smooth; prepectal carina complete; mesosternal furrow not deeply impressed posteriorly; posterior coxae faintly transversely lineolate above toward apex; longer calcarium of posterior tibia about half as long as metatarsus; apical teeth of trochanters well developed; radius arising from beyond middle of stigma; radial cell not nearly attaining extreme apex of wing; first cubital cell about as long as first discoidal; second abscissa of cubitus much more than half the length of recurrent vein; nervulus interstitial with basal vein; submedian cell weakly hairy at apex; radiella weakly sinuate, radiellan cell a little the narrowest at the middle; mediella fully twice lower abscissa of basella; nervellus not inclivous; upper abscissa of basella interstitial with transverse abscissa of subcostella.

Abdomen not distinctly longer than head and thorax combined, its greatest width about equal to width of mesoscutum; first tergite not twice as long as broad at apex, deeply impressed at base, entirely

closely striate, the spiracles not beyond basal fourth of tergite; second tergite broader at apex than long, longitudinally striate, the lateral depressed margins broad at base; third tergite subequal with second, finely aciculate at base; rest smooth, ovipositor sheaths about as long as the body.

Testaceous; palpi brownish; antennae piceous, scape and pedicel brownish yellow; legs deep testaceous; tarsi a little infuscated; wings distinctly somewhat fuscous.

Type.—U.S.N.M. No. 43497.

Type locality.—Germantown, Pa.

Remarks.—Described from three females from the type locality and one female from Maspeth, Long Island, N. Y. The type and one paratype were collected September 25, 1904, the two remaining paratypes on October 1, 1904, and September 27, 1924, respectively. The only paratype with complete antennae has these 45-segmented, like the type.

31. MACROCENTRUS PALLISTERI De Gant

Macrocentrus paediscae RILEY MS., Insect Life, vol. 3, p. 59, 1891.

Macrocentrus pallisteri DE GANT, Proc. Ent. Soc. Washington, vol. 32, p. 65, 1930.

Type.—In the United States National Museum.

Closely related to *cerasivoranae*, and unusually pale specimens of *pallisteri* are sometimes difficult to distinguish from that species; however, the differences noted in the key will apparently separate the two. It is possible that *pallisteri* is identical with *pectoralis* Provancher, but I have not seen the type or authentically identified specimens of the latter, and accordingly am recognizing *pallisteri* as a valid name.

In length, specimens of *pallisteri* range from 5 mm. to 9 mm. Head but very slightly wider than thorax; face nearly twice as broad as long; temples and cheeks rounded, not strongly receding; clypeus large, long, subtruncate apically; longest segment of maxillary palpus not distinctly as long as second segment of antennal flagellum; antennae usually from 44 to 50 segmented.

Thorax stout; mesopleura anteriorly below, and prepectus, usually closely punctate, sometimes confluent so; mesosternal suture deeply impressed posteriorly; posterior coxae usually transversely aciculate or lineolate apically; first cubital cell large, about as long as first discoidal; second abscissa of cubitus much more than half as long as recurrent, often nearly as long; radius arising from beyond middle of stigma; submedian cell sparsely hairy, at least at apex; nervulus usually interstitial; hind wing with nervellus not inclivous, hardly as long as lower abscissa of basella, which is much less than half as

long as mediella; upper abscissa of basella interstitial with transverse abscissa of subcostella; radiella sinuate though less strongly than in *cerasivoranae*.

Abdomen usually rather stout; first and second tergites strongly longitudinally striate; the third sometimes more delicately so, and the sculpture restricted to basal half or two-thirds; first tergite impressed at base, the spiracles before end of basal fourth and farther from each other than from base of tergite; ovipositor sheaths fully as long as the body.

Ferruginous, varied with black; vertex and more or less of occiput usually blackish; face varying from entirely ferruginous or testaceous to black; thorax also varying from entirely testaceous to mostly black, usually at least the sutures of mesonotum, the metanotum, and the propodeum blackish; legs testaceous or ferruginous, tarsi usually more or less fuscous; wings subhyaline, stigma usually brown, pale at base; abdomen testaceous or ferruginous, the tergites beyond the third most frequently black.

In addition to the type the national collection has specimens representing a range in distribution from Massachusetts and eastern Canada to Missouri and Kansas. Hosts recorded are *Epiblema otiosana* Clemens, *E. scudderiana* Clemens, and *E. strenuana* Walker. I have also seen two collected specimens from Massachusetts in the collection of the Boston Society of Natural History, and one from New York in the Philadelphia Academy of Natural Sciences.

32. MACROCENTRUS CERASIVORANAE Viereck

Macrocentrus cerasivoranae VIERECK, Proc. U. S. Nat. Mus., vol. 42, p. 623, 1912.

Type.—In the United States National Museum.

Easily distinguished except from occasional specimens of *pallisteri*, and the longer antennae and palpi, the color characters mentioned in the key, the usually more strongly receding temples and cheeks, and the usually relatively shorter ocell-ocular line, will separate it from that species.

Length usually 7 to 9 mm. Head but little wider than thorax; face shining, but usually punctate; clypeus large, long, not distinctly twice as broad as long; eyes prominent, large; ocell-ocular line usually distinctly less than one and one-half times diameter of a lateral ocellus. Prescutum usually more prominently elevated than in *pallisteri*; lower part of mesopleura depressed and closely punctate; metapleura punctate, confluent so posteriorly; posterior coxae usually finely transversely aciculate or lineolate; first cubital cell about as long as first discoidal; second abscissa of cubitus distinctly more, usually much more, than half as long as recurrent vein; radius

arising from much beyond middle of stigma, inner side of latter twice as long as the outer; nervulus usually a little postfurcal, rarely interstitial; radiella strongly arched so that radiellan cell is very narrow at the middle; mediella twice as long as lower abscissa of basella, the latter fully as long as nervellus; upper abscissa of basella interstitial with transverse abscissa of subcostella. Abdomen longer than head and thorax combined; first and second, and most of third, tergites closely longitudinally striate; first tergite impressed at base; spiracles not beyond basal fourth of tergite; ovipositor sheaths a little longer than the body.

Color uniformly ferruginous; antennae sometimes more or less brownish; tarsi usually paler than femora or tibiae; wings hyaline; stigma uniformly yellow or brownish yellow.

In addition to the type series the national collection contains several specimens reared from *Cacoecia ferridana* Clemens in North Carolina and Virginia (C. Heinrich), two from *Cacoecia cerasivorana* Fitch in Ohio (H. C. Ingerson), and collected specimens from Maine, New Hampshire, New York, Pennsylvania, Connecticut, Michigan, Kansas, Colorado, Arizona, New Mexico, and Washington. Additional material examined consists of several specimens in the collection of the Boston Society of Natural History from Marthas Vineyard and Nantucket, Mass., and more than 200 specimens at the gipsy moth laboratory, which were reared from *C. cerasivorana* and *C. ferridana* taken at various localities in the New England States and New Jersey.

33. MACROCENTRUS DELICATUS Cresson

Macrocentrus delicatus CRESSON, Trans. Amer. Ent. Soc., vol. 4, p. 178, 1872.

Type.—In the Academy of Natural Sciences of Philadelphia.

Most closely allied to *nuperus* and *texanus* but easily distinguished from both by lacking the conspicuous blackish transverse band on vertex, and otherwise as noted in the key.

One of the most common of the Nearctic species of *Macrocentrus*, and rather easily recognized. The following descriptive notes are given to supplement the characters mentioned in the key: Ranges in length from about 4 mm to about 8 mm. Head considerably wider than thorax; eyes very large; temples and cheeks strongly receding directly behind eyes; antennae usually 48 to 55 segmented, but rarely, in unusually large specimens, up to 60-segmented; the male scape conspicuously thickened; face smooth, not or indistinctly broader than long; longest segment of maxillary palpus usually a little longer than second segment of antennal flagellum. Mesoscutum smooth medially behind, the notauli usually not nearly extending

to apex; propodeum mostly delicately and more or less transversely sculptured, smooth at base; sides of pronotum and pleura polished; radius arising from much beyond middle of stigma, the first abscissa of radius perpendicular to anterior margin of wing, or only very slightly oblique; first discoidal cell longer than first cubital; submedian cell weakly hairy, usually with a hairless area apically; nervulus usually postfurcal by its own length, or very nearly; mediella fully twice the lower abscissa of basella, the latter usually a little longer than nervellus. Abdomen with first, second, and more or less of third, tergites closely longitudinally aciculate; the first convex at base, not impressed in front of the spiracles, the latter near end of basal third and usually distinctly farther from base of tergite than from each other; spiracles not very prominent; ovipositor sheaths distinctly a little longer than the body.

Yellow; sometimes completely yellow, but most frequently with more or less of dorsum of thorax and abdomen varied with black; in the darkest specimens mesonotal lobes, scutellum, metanotum, and propodeum piceous to blackish with the abdomen entirely blackish except at apex; head always yellow; palpi pale yellow, antennae yellowish, basal flagellar segments sometimes darker; legs yellow; wings hyaline, stigma always entirely yellow, veins yellowish to brown.

The following material, in addition to the type, has been examined: At the United States National Museum, two paratypes from Texas and a large number of specimens from numerous localities ranging from Pennsylvania to Florida and Texas, and including material reared from *Laspeyresia molesta* Busck, *Pyrausta nubilalis* Hübner, *Rhopobota vacciniana* Packard, *Carpocapsa pomonella* Linnaeus, *Epiblema tripartitana* Zeller, *E. strenuana* Walker, *Aristotelia absconditella* Walker, *Euzophera ostricolorella* Hulst, *Proteopteryx bolliana* Slingerland, and *Tetralopha subcanalis* Walker; many specimens reared from *Laspeyresia molesta* and *Epiblema strenuana* taken in New Jersey, Tennessee, and Ohio, which were sent me for study by H. W. Allen, in charge of the oriental fruit moth investigations, at Moorestown, N. J.; a series from the European Corn Borer Laboratory, at Monroe, Mich., reared from *Papaipema nebris* Guenée, taken in Ohio; several hundred specimens reared by H. G. Butler, of the Bureau of Entomology, from *L. molesta* at Harrison, Tenn.; a series from the same host reared by J. O. Pepper at Chambersburg, Pa.; one specimen from Cohasset, Mass., in the collection of the Boston Society of Natural History, and 14 specimens at the gipsy moth laboratory reared from *Episimus argutanus* Clemens, taken at Revere and Roxbury, Mass.

34. *MACROCENTRUS NUPERUS* Cresson

Macrocentrus nuperus CRESSON, Trans. Amer. Ent. Soc., vol. 4, p. 178, 1872.

Type.—In the Academy of Natural Sciences of Philadelphia.

From *delicatus*, to which it is allied, *nuperus* differs especially in the longer and narrower three basal abdominal tergites, with the spiracles of the first even farther from the base and more prominent, in the nervulus being postfurcal by only half its length or less, in the somewhat longer malar space, and in having a transverse black band across vertex. From *texanus*, which it also closely resembles, it is readily distinguished by the much longer and strongly sculptured basal tergites of the abdomen and the shorter calcaria of the posterior tibiae.

In length the specimens examined range from 7 to 9 mm. Antennae usually more than 50-segmented; longest segment of maxillary palpus about as long as second segment of antennal flagellum; notauli extending nearly to extreme apex of mesoscutum; scutellar furrow very large; mesopleura usually punctate below; metapleural tooth prominent, truncate; posterior coxae very long; longer calcarium of hind tibia about half as long as metatarsus, not distinctly longer; radius arising from beyond middle of stigma; first discoidal cell somewhat longer than first cubital; submedian cell with only a few scattered hairs; mediella a little more than twice as long as lower abscissa of basella, the latter fully as long as nervellus; upper abscissa of basella interstitial with transverse abscissa of subcostella; abdomen much longer than head and thorax combined; first tergite more than three times as long as broad at apex, not at all impressed at base in front of spiracles, the surface of tergite irregularly longitudinally rugulose or ruguloso-striate, the spiracles at about end of basal third and much farther from base of tergite than from each other; second tergite twice as long as broad, longitudinally ruguloso-striate, parallel-sided, the lateral depressed margins rather broad, the raised sculptured part constricted medially; third tergite fully one and one-half times as long as broad, delicately longitudinally aciculated on basal half or more; ovipositor sheaths about as long as body.

Yellow; vertex with a transverse blackish band extending almost to the eyes; antennae yellow, the three or four basal flagellar segments blackish; mesonotal lobes with more or less dusky to blackish median markings, that on middle lobe usually broadest and darkest; wings hyaline, stigma yellow; legs yellow.

The foregoing notes are based on the type and on six collected specimens in the United States National Museum; four of these six are, like the type, from Texas; two are from Plummers Island, Md.

35. MACROCENTRUS TEXANUS, new species

Most similar to *nuperus* and *delicatus* but distinguished as noted in the key and in the discussions under those species. It is also closely allied to *uniformis*, which it resembles in the long calcaria of the posterior tibiae, the prominent acute metapleural tooth, the unusually long second abscissa of cubitus, the unusually long palpi, the sinuate radiella, and the mostly smooth abdomen; but it differs especially in the long ovipositor, the less strongly compressed abdomen, the shape of the first abdominal tergite, which narrows rather strongly from the spiracles to the base, and the narrow temples and cheeks.

Female.—Length 8 mm. Head strongly transverse; temples and cheeks receding directly behind the eyes; eyes large, very prominent; malar space short; face broader than long, polished; vertex rising scarcely above upper level of eyes; postocellar and ocell-ocular lines subequal, about one and one-half times the diameter of a lateral ocellus; maxillary palpi very long, the longest segment nearly as long as first segment of antennal flagellum, much longer than second; apical segment of labial palpus long; antennae much longer than body, 56-segmented; scape rather stout.

Thorax short; notauli not foveolate except posteriorly; propodeum short, not convex longitudinally, very weakly transversely sculptured, nearly smooth at base; sides of pronotum, and the mesopleura and metapleura, smooth; mesosternal suture distinct only posteriorly; legs long, slender; longer calcarium of hind tibia longer than half the basitarsus; stigma elongate, radius arising from a little beyond its middle; second abscissa of cubitus longer than recurrent; first cubital cell fully as long as first discoidal; third abscissa of radius less than twice the second; nervulus postfurcal by at least two-thirds its length; submedian cell hairless; first brachial cell with only scattered hairs; radiella somewhat sinuate, the radiellan cell broadest at apex, narrowest at middle; mediella hardly twice the lower abscissa of basella, the latter a little longer than nervellus.

Abdomen slender, longer than head and thorax combined; first tergite nearly three times as long as broad at apex, not at all impressed at base in front of spiracles, mostly smooth, with only a little indefinite sculpture near middle, the spiracles near end of basal third, and much farther from base of tergite than from each other; second and third tergites subequal, the second not distinctly longer than third, both slightly longer than wide, both with a little faint aciculation at base; ovipositor sheaths fully as long as the body.

Testaceous; vertex with a transverse blackish band extending very nearly to the eyes; mesonotal lobes blackish medially; wings hyaline,

costa and stigma yellow; antennae yellow, the basal flagellar segments not darker.

Type.—U.S.N.M. No. 43493.

Type locality.—Dallas, Tex.

Remarks.—Described from a single specimen collected April 17, 1908, by F. C. Bishopp.

36. *MACROCENTRUS UNIFORMIS* Provancher

Macrocentrus uniformis (CRESSON) PROVANCHER, Nat. Can., vol. 12, p. 173, 1880.

Type.—In the Museum of Public Instruction, Quebec, Canada.

Differs from all other Nearctic species in its very short ovipositor, which is shorter than the height of the apical truncature of the abdomen. It agrees in this as well as in all other important respects with the genotypes of *Dolichozele* Viereck and *Paniscozele* Enderlein, the synonymy of which has been discussed earlier in this paper. Except for the decided difference in the ovipositor it rather closely resembles *texanus*, being readily separable, however, by the differences mentioned in the key and in the description of that species.

A large species, ranging in length from about 7 to 10 mm. Head transverse, wider than thorax; temples and cheeks convex, not receding directly behind eyes; eyes prominent, diverging a little below; face at least one and one-half times as broad as long; malar space as long as basal width of mandible; mandibles stout; maxillary palpi very long, the longest segment longer than first segment of antennal flagellum; labial palpi much longer than face; antennae more than one and one-half times as long as the body, about 50-segmented.

Thorax rather short, deep, mostly smooth and shining; prescutum prominent; propodeum more or less transversely rugulose, smooth basally at least at sides; pleura smooth; metapleural tooth prominent, acute; legs very slender; posterior coxae long; longer calcarium of hind tibia much more than half as long as basitarsus in the male, in the female usually three-fourths as long, the basitarsus being relatively longer in the male than in the female; wings very large and broad; stigma elongate, radius arising from beyond its middle; radial cell very nearly attaining extreme apex of wing; first cubital cell large, very nearly or quite as long as first discoidal; second abscissa of cubitus more than half as long, sometimes as long, as recurrent vein; nervulus only slightly postfurcal; submedian cell widened at apex and entirely glabrous; first brachial cell also glabrous basally; mediella twice as long as lower abscissa of basella, which is longer than nervellus and about twice as long as upper abscissa of basella; radiella strongly sinuate, the radiellan cell very narrow at the middle.

Abdomen a little longer than head and thorax combined, compressed apically; first tergite slender, more than three times as long as broad at apex, not distinctly impressed at base in front of spiracles, the latter prominent, a little farther from base of tergite than from each other; second and third tergites not distinctly separated, the second suture wanting or very faint; dorsal surface of abdomen smooth, sometimes with a little faint sculpture on first tergite; ovipositor sheaths shorter than height of apical truncature of abdomen.

Testaceous or ferruginous; the head in front, pleura, and sternum usually paler; antennae usually testaceous, brownish apically, but sometimes flagellum entirely dark; vertex completely black; usually mesonotal lobes more or less blackish down the middle, wings hyaline, veins brown, stigma testaceous; legs testaceous, hind tarsi pale yellow.

The national collection contains 34 specimens; of these 4 were reared from *Psycomorpha epimenis* Drury at Green Village, N. J., by Charles Rummel; the remainder are collected specimens from various localities in Maryland, Virginia, Pennsylvania, District of Columbia, North Carolina, Kentucky, Georgia, Illinois, and Kansas. I have also examined 11 specimens taken at Raleigh, N. C., which were sent me by C. S. Brimley; a single specimen at the gipsy moth laboratory reared from *Alypia octomaculata* Fabricius by J. V. Schaffner, jr., the host having been taken at Brockport, N. Y.; and a specimen at the Academy of Natural Sciences of Philadelphia labeled "*Macrocentrus uniformis* Cress. MS."

SPECIES THAT HAVE NOT BEEN RECOGNIZED

MACROCENTRUS IRIDESCENS French

Macrocentrus iridescens FRENCH, 6th Ann. Rep. Southern Illinois Normal Univ., p. 42, 1880.

Type.—Location unknown.

It has not been possible to identify this species with certainty from the original description; accordingly it has been omitted from the key. However, I have seen two male specimens in the Academy of Natural Sciences of Philadelphia that are labeled "Carbondale, Ills., May 18, 1878, French Coll." and bear the name label *Macrocentrus iridescens* French. These are *amicroploides* Viereck. If they are correctly identified as *iridescens* it will become necessary to suppress *amicroploides* as a synonym. Since French, in his description, acknowledged his indebtedness to E. T. Cresson for the generic determination of the species, and since his type series consisted of 12 specimens, it seems rather likely that he sent Cresson specimens for the collection of the Philadelphia Academy, and that the two specimens referred to above are actually paratypes. Nevertheless, I hesitate to synonymize *amicroploides*, owing to the fact that French described the ovipositor of *iridescens* as "not exerted."

MACROCENTRUS NIGRIDORSIS Viereck

Macrocentrus nigridorsis VIERECK, Can. Ent., vol. 56, p. 68, 1924.

Type.—In the Canadian National Collection at Ottawa.

As already mentioned this species is obviously very similar to, if not identical with, *harrisi*; there appears to be nothing in the original description which will separate it from *harrisi*, and I believe a comparison of the types will make necessary the suppression of the latter name as a synonym.

MACROCENTRUS PECTORALIS Provancher

Macrocentrus pectoralis PROVANCHER, Nat. Can., vol. 12, p. 173, 1880.

Type.—In the Museum of Public Instruction at Quebec, Canada,

Since I have not seen the type, and am unable definitely to identify the species from the original description or from notes made by Rohwer, I have omitted *pectoralis* from the key. It appears, however, to be exceedingly similar to *pallisteri* and may be found to be identical with that species, in which case *pallisteri* would fall as a synonym.

HOSTS OF MACROCENTRUS RECORDED IN THIS PAPER

Host	Species of Macrocentrus	
<i>Aerobasis caryivorella</i> Ragonot.....	<i>instabilis</i> Muesebeck	
<i>hebescella</i> Hulst.....	<i>instabilis</i> Muesebeck	
sp.....	<i>laspeyresiae</i> Muesebeck	
<i>Alypia octomaculata</i> Fabricius.....	<i>uniformis</i> Provancher	
<i>Anacampsis</i> sp.....	<i>ancylivorus</i> Rohwer	
<i>Ancylis comptana</i> Frölich.....	<i>ancylivorus</i> Rohwer	
sp.....	<i>nigripectus</i> Muesebeck	
<i>Aristotelia absconditella</i> Walker.....	<i>delicatus</i> Cresson	
<i>Cacoecia argyrospila</i> Walker.....	<i>amicroploides</i> Viereck	
<i>cerasivorana</i> Fitch.....	<i>cerasivoranae</i> Viereck	
<i>fervidana</i> Clemens.....	<i>cerasivoranae</i> Viereck	
<i>parallela</i> Robinson.....	<i>harrisi</i> De Gant	
<i>purpurana</i> Clemens.....	<i>harrisi</i> De Gant	
<i>rosaceana</i> Harris.....	<i>amicroploides</i> Viereck	
<i>rosana</i> Linnaeus.....	<i>amicroploides</i> Viereck	
<i>Canarsia</i> sp.....	<i>canarsiae</i> Muesebeck	
<i>Canarsia</i> sp.....	<i>ancylivorus</i> Rohwer	
<i>Carpocapsa pomonella</i> Linnaeus.....	{	<i>ancylivorus</i> Rohwer
		<i>laspeyresiae</i> Muesebeck
		<i>delicatus</i> Cresson
<i>Coloephora malivorella</i> Riley.....	<i>instabilis</i> Muesebeck	
<i>Crambus hortuellus</i> Hübner.....	<i>crambivorus</i> Viereck	
<i>mutabilis</i> Clemens.....	<i>crambi</i> (Ashmead)	
<i>trisectus</i> Walker.....	<i>crambi</i> (Ashmead)	
<i>zeellus</i> Fernald.....	<i>crambi</i> (Ashmead)	
sp.....	<i>crambivorus</i> Viereck	
<i>Crocidophora pustuliferalis</i> Lederer.....	<i>crocidophorac</i> Muesebeck	
<i>Epagoge</i> sp.....	<i>ancylivorus</i> Rohwer	
<i>Epiblema otiosana</i> Clemens.....	<i>pallisteri</i> De Gant	
<i>scudderiana</i> Clemens.....	<i>pallisteri</i> De Gant	
<i>strenuana</i> Walker.....	{	<i>pallisteri</i> De Gant
		<i>delicatus</i> Cresson
<i>tripartitana</i> Zeller.....	<i>ancylivorus</i> Rohwer	
<i>Episimus argutanus</i> Clemens.....	<i>delicatus</i> Cresson	
<i>Euzophera ostricolorella</i> Hulst.....	<i>delicatus</i> Cresson	
<i>Exartema fasciatana</i> Clemens.....	<i>harrisi</i> De Gant	
<i>sericorana</i> Walsingham.....	<i>ancylivorus</i> Rohwer	
<i>Hadena devastatrix</i> Brace.....	<i>crassipes</i> Muesebeck	
<i>Harpipteryx frustrella</i> Walsingham.....	<i>amicroploides</i> Viereck	
<i>Homeosoma electellum</i> Hulst.....	<i>ancylivorus</i> Rohwer	
<i>Laspeyresia caryana</i> Fitch.....	<i>laspeyresiae</i> Muesebeck	
(?) <i>cupressana</i> Kearfott.....	<i>acgeriae</i> Rohwer	
<i>funebrana</i> Treitschke.....	<i>instabilis</i> Muesebeck	

Host	Species of <i>Macrocentrus</i>
<i>Laspeyresia molesta</i> Busck	{ <i>ancylivorus</i> Rohwer <i>instabilis</i> Muesebeck <i>delicatus</i> Cresson <i>laspeyresiae</i> Muesebeck
<i>Papaipema nebris</i> Guenée	<i>delicatus</i> Cresson
<i>Peronea variana</i> Fernald	<i>peroneae</i> Muesebeck
<i>Proteopteryx bolliana</i> Slingerland	{ <i>aegeriae</i> Rohwer <i>delicatus</i> Cresson
<i>Psycomorpha epimenis</i> Drury	<i>uniformis</i> Provancher
<i>Pyrausta ainsliei</i> Heinrich	<i>utilis</i> Muesebeck
<i>nubilalis</i> Hübner	{ <i>gifuensis</i> Ashmead <i>robustus</i> Muesebeck <i>delicatus</i> Cresson
<i>pertextalis</i> Lederer	{ <i>pyraustae</i> Viereck <i>amicroploides</i> Viereck
<i>theseusalis</i> Walker	<i>pyraustae</i> Viereck
<i>Rhopobota vacciniana</i> Packard	<i>delicatus</i> Cresson
<i>Rhyacionia rigidana</i> Fernald	<i>laspeyresiae</i> Muesebeck
<i>Synanthedon americana</i> Beutenmüller	<i>aegeriae</i> Rohwer
<i>castaneae</i> Busck	<i>aegeriae</i> Rohwer
<i>exitiosa</i> Say	<i>aegeriae</i> Rohwer
<i>pictipes</i> Grote and Robinson	<i>aegeriae</i> Rohwer
<i>tipuliformis</i> Linnaeus	<i>aegeriae</i> Rohwer
<i>Tetralopha subcanalis</i> Walker	<i>delicatus</i> Cresson
<i>Tmetocera ocellana</i> Schiffermüller	<i>amicroploides</i> Viereck

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